# **ESTABLISHING OPERATION PHAKISA FROM DREAMS TO REALITY: SECURING AFRICA’S MARITIME ECONOMIC FUTURE THROUGH MARITIME EDUCATION:**

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## ABSTRACT

From the land to the oceans! Africa via its African Union Maritime Strategy and South Africa via Operation Phakisa are prioritising the ‘blue’ or ocean-based economy, as the next frontier to enhance growth and development. However; whilst there have been several reports, manifestos and pilot projects; limited attention has focused on the practical side of ensuring a maritime future occurs. Africa is a historically land orientated continent, in a world with few concrete examples of completely, marine oriented economies, educations, policies, financial support and practical case studies. This report concentrates on transforming Operation Phakisa from dreams to reality. It aspires to illuminate the potential contribution the maritime sector could make to the future of Africa, its states and its individuals. This argues its significance for us all through improving vocational prospects, once we seek to rectify scarce skills. Without investing in maritime education legislation, specialised facilities, ensuring funding, enthusiastic students, capable entrepreneurs, forming partnerships and networking and aligning these to key priorities; Africa’s maritime future will swiftly fail into obliteration.

This report proposes providing a constitutionally enshrined, well defined, funded, coordinating sector institution such as SAIMI so that existing and future maritime education, policies, businesses, stakeholders, research and projects flourishes. Its overarching objective would be to improve existing and future maritime related, institutional capacity, wherever necessary. This enables us to survive in the forthcoming age, where the ocean and the maritime sector will pay an ever increasing and vital part in all our lives… One that we cannot afford to marginalise, ignore or be uneducated to resolve… All we have to do is empower our continental economy through investing in maritime education –in training and research; to address the challenges and problems we individually and collectively face as humans.

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## PREFACE: WHY?

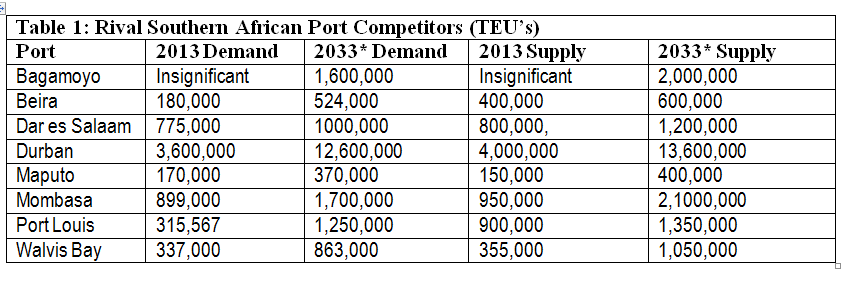
The Ocean... Its magic and mysteries have enchanted humanity since the dawn of our species… Without navigating it, we would have never colonised the world. Without it, we would not be able to sustain ourselves. Its physical presence, our beaches and coastline nourish us, entertain, soothes, revive and inspire us…We have looked to the oceans and the maritime sector to advance our species and to chart our course. The Indian and Atlantic Oceans have formed our history as Africans; guided our trade; inspired our culture; provided so many resources. It serves as a true global highway – in population; in ideas; in capital investment etc. -of progress and development, especially through seaports; interconnecting all parts of our human populated world… mere archipelagos in the aquatic void... For Ages we have depended upon. Seldom have we sought to understand it and ensure its survival. In an age of climate change and dominated by globalisation, with shipping the prime messenger amidst increasing inter-port competitiveness; that has just witnessed the completion of an extended Panama Canal leading to a new Post-Panamax Age in vessel technology and unprecedented magnitudes exceeding 18,000 TEU’s each, we as Africa can no longer remain blind…

UNCTAD estimates over 90% of world commerce is seaborne. With a coastline over 26,000 kilometres in length, the African continent, apart from a narrow land bridge at the Sinai Peninsula (and with the Suez Canal), we are an island… We in Africa are utterly just as dependent upon the maritime sector for our economic growth and potential development… as the hinterland to which so many only ever preoccupy themselves with. As the threat of global climate change emerges as the prime challenge for the twenty first century; the maritime sector is destined to become increasingly more vital to the future of humanity. We in Africa can no longer afford to ignore this as South Africa has recognised with Operation Phakisa symbolically launched in our most significant continental port, Durban South Africa in October 2014 by President Jacob Zuma and the African Union has recognised in its 2014, Africa Maritime Vision Declaration.

We cannot ignore this essential part of our world. Without it –without the maritime sector; Africa would have never reached its position in the world. We would remain isolated. Yet how much do we really appreciate it as Africans? Yet how often do we value seaports and the associated maritime economy for which we are so reliant to function as catalysts of economic growth and development? How much do we really know and understand? Of what personal interest is it to us? How has it enriched our lives? What could it potentially mean for us? How many of us have ever considered it even as a calling or vocation? To many it means just fishing or recreational as a beach. And yet we need the maritime sector and the skills they provide. For as this paper seeks to convey; without them, we and other continents would never be able to mutually benefit from each other. As other continents have learnt; it is this above all other economic sectors, which has the potential to transform our economies and enable us to assert our true potential –as a maritime power in the twenty first century.

Throughout history, it has been the powers who have exerted influence on the seas; who have chosen to become maritime powers that have established the tides of humanity and both the direction and the nature of our advancement. The Greeks established mastery over the Mediterranean, and were able to disseminate colonies and ideas. The Romans defeated Carthage –their largest maritime threat and were able to hold their empire for centuries –with their grain fleets to establish political stability and navies to swiftly move their legions throughout the empire. Admiral Zheng He’s Fleet’s established Chinese influence as far as Africa in the 1400’s. The Spanish, French, Portuguese, British, Dutch and Germans were all able to colonise the world and transform their economies through seeking to command the seas over their landlocked opponents. And the world would not be the same if their voyages of colonisation, commerce; exploration and scientific discovery had never materialised. The Japanese were first taken seriously when they defeated the Russian fleet in 1905 and the US and UK would have never established their hegemony and sphere of influence throughout the world if they had relied on land power alone… The significance of the maritime sector continues today. The majority of world cruises are controlled by just 8 large corporations and containerised cargo through the top 25 lines such as Danish company MAERSK, Chinese company Evergreen, French CGM CMA and Mediterranean Shipping Company (MSC) subtly dominating the world’s trade… carrying over 84% according to UNCTAD. In Antarctica and the Arctic as polar ice sheets melt to the plundering of global maritime ecosystems, Australian naval modernisation, China’s posturing and artificial islands in the ‘South China Seas’ to the disappearing of the Maldives, Kiribati, Tokelau and Tuvalu as the first global territories to disappear in the 2020’s, maritime sovereignty dominates!

If Africa is ever to progress and ignite a true Economic African Renaissance, if it is ever to establish its own course as a continent of independent states capable of asserting its true autonomy amid the assembly of nations on Earth, if it is ever to advance its people and lessen its dependency…It cannot afford to ignore the sector that will empower it to do so. This is the African century. To support the African Union’s 2050 Maritime Vision and the South African Government’s Operation Phakisa; this paper seeks to ensure Africa’s future as a continental maritime power! It recognises the scarcity of research in this area, of those who are able to currently identify the critical issues facing the maritime sector –despite the urgent necessity –let alone are gifted and blessed with the capacity to move forward and join other continents in a new Maritime Renaissance. Or even to begin to benefit from the maritime sector. It argues that it is the maritime sector that offers substantial opportunities for development, investment and macroeconomic potential to truly transform the lives of my fellow African citizens Contemporary research is biased towards those not of Africa. Too few in Africa have even thought about the maritime sector as a sustainable bastion of economic development potential; the answer to many of our challenges and concerns. How little is truly known or understood popularly about the maritime sector in Africa, for Africans. Or; if we ignore them, every potential indicator of progress that we as Africa have made, will be countered by the impact of increased storm, current, winds, rain, temperatures and other maritime related phenomena, on a hapless coastal community… unlike those preparing to weather the elements in Southeast Asia, the Caribbean and the Pacific. Nor are we as African’ sufficiently fluent and familiar enough with the potential impact of climate change upon the maritime sector and how to enable our communities and 54 countries to survive. This is just one of the many unknowns that having devoted African centred maritime education, curriculum and research facilities, legally enshrined could resolve.



There are also significant chances for maritime education to aid existing and future, maritime economic prospects. As the table above partially illustrates in terms of physical port expansions increasing capacity between 2013-2033 no other sector economically could even begin to compete with the opportunities t myriad African, physical port expansions and modernisation programmes from Durban in South Africa to Mombasa, Bagamoyo, Maputo, Port Victoria and Dar es Salaam in East Africa to Tema and Takoradi ports in West Africa may provide. This is further developed in my University of KwaZulu Natal, Master’s dissertation: “Is Durban’s Proposed Port Expansion Really Necessary?” It is this developmental approach –enhancing existing efficiency in transport/ logistics and the associated maritime based economy that governments and port authorities are seeking to invest the future of their countries; especially for our home continent. It is the chances these potentially offer, that necessitate investment in scarce skills and maritime education. To quote two examples from personal experience this paper cites the proposed port expansion examples of Durban and Mombasa, among 2 of Africa’s largest current infrastructure projects. These illustrate the potential to transform the local, regional and national economies from a maritime perspective through associated expenditure, improved infrastructure, services; training and related employment, productivity; revenue, trade, investment and other potential benefits (although there are always significant social, environmental, opportunity and other associated development costs).

We as African’s have to be prepared! We have to adapt or perish! The global future of shipping faces many uncertain prospects, aside from slow economic recovery from the 2008 global recessionary aftermath constricting demand with low freight rates and profitability from a significant oversupply of vessels, mergers and Hanjin Shipping bankruptcy. We as Africa will have to consider the physical and reputational damage of Somalian piracy and other threats to global maritime security challenges (to which the world is responding through increased customs modernisation and training programmes, an April 2013 IMO Anti-Piracy Code and a dedicated though under-supported Counter Piracy Strike Force; the 3% increase in Suez Canal tariffs; the impact of Post-Panamax vessels, increased regulatory expenses including 1996 Convention on Limitation of Liability for Maritime Claims/SOLAS amendments and others The maritime insurance industry incurred $50 -60 billion losses in 2012 –a 13% claim rise since 2011. This causes the shipping industry to face projected average additional 7% rises in insurance premium costs and 15% minimum for marine reinsurance. This is apart from needing to resolve the exogenous and endogenous constraints to optimising port potential.

But we as Africans face our own maritime challenges aside from inefficient ports and scarce skills that it is essential to resolve. We have no maritime stock exchange or insurance sector; archaic maritime infrastructure, technology and services for most of our ports –paralysing developments. Many of our terminals and ports are leased to foreigners; few maritime lawyers, few shipyards. We have far too few academics and professionals equipped; no specialised maritime banks –not even local shipping companies and vessels of our own. (Despite Liberia having the largest flag of convenience registry in the world). As a maritime power; we are non-existent. Our fate –far more than merely our trade alone; is utterly conditional on the whim of outsiders? Can we increasingly afford this? How can we profess to be launching an economic Renaissance and consider ourselves emerging independent powers –as Africans able to rank equally to the rest of the world? All these present opportunities. If we are to consider ourselves as seriously capable of launching Africa and its individual 54 nations as a maritime power; if we are to make a difference, we need to resolve all of these… through a physical commitment to invest in the opportunities; research, educational training, technology and other resources necessary to make Africa a true Maritime Power in this forthcoming Maritime Age. This report seeks to establish Operation Phakisa beyond dreams to physical reality in outlining the future of maritime education, how it can be financed and how it can contribute to an actual maritime economy in South Africa and for Africa.

As Africans, do we seek to remain dependent upon external sources or to charter forth of our own path? Africa’s economic destiny lies within investing in its maritime sector; particularly in education to resolve the scarce skills crisis afflicting our continent; preventing it from attaining its maritime future. This approach is favoured by South African Transport Minister Dipuo Peters: *“T****he government must make sure that education and research in South Africa’s maritime sector be implemented as soon as possible and benefits our economy. It would be great to see South Africa becoming part of the 35 nations that enjoy a 95% league of the world’s trade vessels, sighted moving in and out of our waters.******One of our immediate tasks is to find solutions that speak to the maintenance of those in possession of scarce skills and competencies, particularly in the maritime sector. But in order for our maritime sector to develop and eventually grow, we need to focus and invest in the necessary skills and training.”***

So what is the future for Africa as a maritime power? As stated, if we are to undertake the African Union Vision 2050 of Africa unleashing its maritime economic potential; an approach that South Africa through its 2011 National Development Plan and Coastal Survey is seeking to endorse. We need to invest in higher education in the maritime sector; to favour research and skills development capacity by encouraging students to pursue it as a vocational prospect of the future, to increase funding potential. We need to establish international networks with those outside the African continent, to publicise the maritime schools; by working with the few schools and individuals (such as myself); who have specialised in the maritime sector to devise textbooks; curriculums; training, research and funding. This will equip potential African graduates to succeed in a world where over 90% of global commerce is seaborne based. After all, our future will be ever increasingly dependent upon the maritime sector for economic development and sustainability, amidst the uncertain impact of potential climate change and other surfacing risks. Therefore, to enable fellow Africans to contribute towards our envisioned destiny as a true Maritime Power; as advised to Regent Business School, the following curriculum is proposed. It follows a proposed African Doctrine of actively seeking to consult leading international port authorities; specialised maritime theoretical and vocational training facilities/academics; the state and the port community. They need to be educated enough so they are qualified to take part as Africans in answering the challenges facing the maritime sector; to overcome the scarcity of the skills and other constraints/ issues that we as Africans face and to propose indigenous solutions and trained African professionals to exploit all the opportunities.

A proposed curriculum might include physical operations and equipment training, customs theory and administration, freight handling; analysis of sea freight markets, maritime law, port economics –especially expansions and developments; shipping –maritime history and current maritime affairs. It could include international trade, logistics, international business transactions in shipping, carriage of goods by sea; maritime insurance and finance; climate change, oceanography and other related maritime sciences. To prepare fellow Africans, educators would have to also satisfy the requirements and expectations that key port users themselves have devised and overall employability skills including CV’s, interview preparation; Internet skills and eco-literacy; driving and equipment operating/ repairs; basic finance, business and legal principles However, these skills also have the distinctive advantage of being easily transferable to many other economic sectors as career skills development; up to international standards. Only then can we begin to emerge as a maritime power; the catalyst that could grant both the coastal powers and their dependent landlocked neighbours, the chance to progress in the forthcoming century! Perhaps then we as Africans can have many of our individual coastal states and our continent as true maritime powers… Amid increasing inter-port competitiveness from other Southern hemisphere physical port expansions from the 42 renovated ports in Brazil to expansions in Darwin, Sydney, Melbourne and Auckland and increasing economic competitiveness; the maritime sector requires African consideration for trade creation and trade diversion, as the curriculum above seeks to practically focus on preparing generations of Africans for these prospects; to make the Ocean their vocation and their passion… We need to make the most of numerous funding sources of states, port authorities and the private sector. We could exploit the port developments, the free trade zones at Mombasa/ elsewhere and maritime policies such as South Africa’s Operation Phakisa and decision to pursue a policy of Cabotage/ its own shipping companies for regional trade, or face our prospects being swamped by outsiders once more...

It is estimated that the transport/ logistics sector –primarily the maritime sector directly contributed 8.2% to South Africa’s 2013 Gross Domestic Product and 5.8% of its national employment. Indirectly, it connects and influences virtually every other economic sector. To invest in its scarce skills; will therefore assist sustainable economic growth. If Africa and those abroad were interested in funding profitable, sustainable returns for our continental and individual economies; investing in research innovation, career, skills and other educational development especially in the maritime/ transport/ logistics sector would have the following advantages; especially in developing a currently lacking institutional capacity for these, amid few sources of existing learning. At the moment we have to often resort to hiring international consultants from abroad. The cost of these and educating our students abroad (whether to another part of Africa or outside) are substantial. Surely it is better and more cost-efficacious to support and train our own? If we are prepared to improve potential prospects of survival, the commercial viability of the transport/ commercial/state sectors and their members and seek to mitigate potential cost consequences of climate change, the benefits of my current and proposed previous research requires prioritisation, and integrating. This aims to assist all cooperative port community/logistics economy/maritime connected economic stakeholders, the national governments, Africa and certainly the investors themselves significantly. This is especially imperative for our future as any power, not just maritime, given the potential time, financial, externality, delay, and other opportunity costs of inefficient, underprepared, obsolete transport infrastructure and the international supply chain management system, of communities and the economy. This remains highly influenced by the uncertainty of climate change. It outweighs the potential cost of financing and supporting maritime educationto enable the quality of education and skills development not just in South Africa but across the African continent

The right curriculum and maritime education couldhelp the growth of our African economies –especially in the transport/maritime sector and promote sustainable opportunities through skills development in a key scarce area. The following approach of South Africa’s National Skills Development Sector through the maritime sector could apply equally to other maritime African nations:

**4.1 Establishing a credible institutional mechanism for skills planning, 4.2 Increasing access to occupationally‐directed programmes, 4.3 Promoting the growth of a public FET college system that is responsive to sector, local, regional and national skills needs and priorities 4.5 Encouraging better use of workplace‐based skills development with the potential to follow 4.6 assist through community training initiatives to reduce the impact of climate change/ improve skills from existing and future research and 4.8 Building career and vocational guidance. 4.7 Increasing public sector capacity for improved service delivery and supporting the building of a developmental state.**

Given the environmental risks we face from increased global climatic disruption; training our economy toresist the anticipated devastating consequences; expected to be among the forefront of research challenges and innovation development. This will be the prime challenge facing Africa and the world in the 21st century. Investing in relevant training to address contemporary challenges, could work directly towards a vision of a low carbon, sustainable green economy –especially for the transport sector, whilst improving profit, environment, quality of life, efficiency and training for our communities. Therefore, as this report will illuminate; the maritime sector offers one of the greatest chances to transform our historic inequality and poverty. Its current congestion; lack of knowledge, research, understanding, skills, capital and resources have the potential to truly paralyse our economic development and general progress. To ignore the ocean –the role it plays and the impact of climate change; will be to lose our chance to adapt and survive… We have to invest in maritime education and capacity; to utilise the opportunities cited in this report or stagnate, losing the nebulous progress that we have tentatively made as Africans in the past few decades. Through investing in maritime education outlined in this report and a maritime university, the African continent will empower itself.

Without developing our own maritime related sovereignty, whether through port developments amid increasing inter-port competitiveness, r through aquaculture; achieving our own local maritime economy providers, entrepreneurs, innovators, artisans and financiers, we will always be subordinate to others. We must develop our own maritime law expertise; specialised maritime financing, insurance and shipping fleets; operating our own terminals and ports; educating our own; promoting tourism; environmental sustainability and other maritime opportunities. We will be allowing them to dictate our own future as a continent, reminiscent of the colonists of the past, in a global –neo-imperialism. In an increasingly globalised era –with climate change and the recent recession to consider; shipping and intermodal rail provide the most environmentally sustainable, cost efficient and technologically proficient form of transport. It provides the greatest chance for economies of scale and potential fiscal viability as an investment for the physical economy; has an ever increasing chance to economically empower our continent–particularly in Africa; Pursuing Maritime Studies in symbiosis with academics; the state; local and international port related community in Africa; will offers us the chance to be a part of a new speciality that the world will need more of; to understand the challenges facing the maritime sector; to exploit the opportunities it offers and to finally ensure Africa’s future as a maritime power.

## Introduction: Designing A Maritime University

The Preface identified why Africa needs a maritime university to facilitate Operation Phakisa and empower maritime sovereignty, especially through a maritime economy and research. None of the 55 African, sovereign continent states and offshore islands are known for being maritime powers at present, politically, militarily, academically, culturally, economically or otherwise. However, the future belongs to those who consider not just the opportunities but the risks and uncertainties of the maritime sector. This section outlines report characteristics essential for designing a successful African maritime university and education future. Whether a sanctum of pure scholarship and ivory tower introspection, the nexus of maritime connections, stakeholders, policies and artifices, the motherboard of business enterprise, entrepreneurial innovation and commercial solutions, this report seeks to convert Operation Phakisa from dreams to reality. This means the catalyst of Operation Phakisa, can be the resurrector and symbol of hope, vision and daring –pro future aedificanus Africanus Oceanos…Therefore its project aim outlines whatever it takes to extend and transform existing maritime education, businesses and other sources into the institutions, people, places, resources, ecosystems, legislation, alliances, publicity, enterprises, will, energy, skill, talent, imagination and courage to establish this indigenous African approach. Ultimately this aims to completely proclaim our full maritime sovereign independence, only dependent on the world for the mutual transmission of knowledge, technology, experience and expertise we cannot generate ourselves. Therefore, this seeks to address risks and uncertainty, exploit opportunity, sever dependency –African maritime economic prospects, avert a permanent brain drain, survive and prosper more. It considers how the maritime sector can progress Africa first, centred development yet never forgetting the part that we can play to help our world…

Given there is so much the existing world has yet to consider, by specialising in the maritime sector, this report and projected future seeks to provide an example. It summarises that which is necessary to make maritime education, economies and futures flourish more successfully. It aims to make Operation Phakisa more than just a political election manifesto, outlining what it takes to make this work amid a continent and world that for aeons has been so land centred. This author, qualified on three continents, experienced in a number of areas could have followed the path of Elon Musk and other profoundly talented individuals and corporations that voluntarily exiled themselves from this enriching and enlightening future. But as an African, I prefer we surpass those who left us, doing whatever it takes to glisten an aureal reputation for our continent. It is pointless to propose a manifesto and prepare a future unless that destiny can be enacted by others…

To design the ultimate maritime university and education policy for South Africa, Africa, Operation Phakisa and globally, this report summarises and analyses the advantages/disadvantages within existing legislation, accreditation standards and guidelines to formally establish an institution. It proposing legislative amendments to enable subsequent areas proposed to become a reality (section I). It endorses a thoroughly comprehensive curriculum encompassing all areas of maritime research and education, outlining key coursework objectives/focuses in alignment with the highest global standards (section II). It provides potential qualifications, recruitment strategy incentives and other requirements for a world-renowned faculty to be established (section III). This report summarises key local, national, regional and global funding sources that could finance a maritime university, its faculty, research, facilities and students (section IV). The future of maritime education is projected to necessitate excellent laboratory/experimental/simulation facilities (section V) and pilot projects/vessels/field research chances (section VI). Well-designed campus facilities (VII), excellent sources of information and communication (VIII) for stakeholders along with specific considerations to improve resident life (IX) can further assist to recruit and retain prospective students, researchers, funding and faculty (section X).

This report also identifies specific measures to recruit the most qualified, committed, skilled, experienced, connected and enthusiastic students at Primary, Secondary, Tertiary, Postgraduate, Professional and Community levels (section X); adjusting strategies depending on target sources. It summarises key existing prizes, scholarships and competitions (section XI) to enable prospective students to afford the opportunity to fund their studies, augment the reputation of this proposed maritime university/coordinating centre and other sources. This enhances qualifications/resource capacity at the expense/investment of others, where possible. This is especially advised along with improving student/faculty welfare to exempt maritime education from other South African academic protests. To further succeed it identifies approaches to achieve successful, supportive alumni and network of connections to key stakeholders to improve employment, funding, publishing and other prospects. It identifies key maritime related conferences/events and tips (section XII) to assist students/faculty to enhance academic credibility/reputation along with relevant journals/publishing strategies to maximise research impact and funding inputs (Section XIII). Section XIV recognises the failures of existing maritime education to discourage non-academic abilities and creativities by promoting entrepreneurship and Intellectual property to benefit staff, students and the host maritime academic institution. Section XV further provides criteria on ensuring key African/other maritime graduates receive essential vocational guidance and employability skills. Section XVI identifies key professional associations that can assist in networking, funding, research and career prospect opportunities. Section XVII advocates techniques on establishing key industry partnerships and practical/field placement/industry experience.

For a maritime university to retain a prosperous future and form an essential part in an African maritime future; it needs excellent publicity and awareness, domestic and globally through conventional and unconventional public relations and media techniques (Chapter XVIII). It identifies the increasing need and expectation of community benefit/engagement to attract further support/publicity. This aspires to avoid current South African educational/civic dissonance (XIX). It counsels the value of formal and informal lectures and seminars to stimulate creativity and fecund debates (XX). Future research areas which current and other maritime institutions are pursuing as African and global competitors are further illuminated (section XXI). Our official future maritime research strategy is outlined. Chapter XXII considers how this maritime university could capitalise upon maritime economic opportunities linked to Operation Phakisa and globally. Chapter XXIIII concentrates on how other South African/African economy sectors could benefit the maritime economy/research and vice versa. Chapter XXIV suggests potential growth prospects once established, extending further into African markets –to recruit students, expand campuses and collaboration/opportunities. XXV emphasises how establishing this maritime university/education will achieve other central South African development objectives along with Operation Phakisa.

If it is achieved, Chapter XXVI considers the necessity and means of coordinating multiple existing and future associations, information, funding, research, stakeholder and institution sources to succeed, given current failures of maritime education. Chapter XXVII provides an overview of existing maritime education in Africa and globally. These offer potential advantages, disadvantages, research/curriculum areas, as possible research collaborator/exchange partner allies and competitors to outcompete current leaders. Chapter XXVIII analyses how South Africa’s investment can transform the global future of maritime education, scholarship and economies. It indicates how Operation Phakisa can aid other African and global objectives. We can establish African solutions to global problems. Chapter XXIX distinguishes how this African maritime destiny and its education sector can set an example. It is among the first to specifically concentrate on key risks and uncertainty along with various maritime futures. Existing constraints to this maritime education future are summarised in XXX. Potential challenges to overcome are also offered. This report concludes via further conclusions and recommendations in establishing an African future in maritime education, a maritime economy/sovereignty. Endorsing these will further convert Operation Phakisa from dreams to reality.

## CHAPTER I: Legislation –Accreditation

Internationally and domestically, the most significant legal weakness is that there are no formal maritime education, research, curriculum, university and related specific legislation, legally binding policy guidelines or centralised standards upon which any tertiary/secondary sector establishment is formally committed to, other than voluntary professional requirements of membership institutions/specific qualifications. To register a maritime academic institution, research centre and coordinating centre for a maritime economy, has not been specifically prioritised. This creates significant legal uncertainty over the functions, powers, jurisdiction, constraints, resources, legal capacity, financial independence, ethical and research integrity, responsibilities and privileges of any related institution legally, socially, politically, commercially, academically or otherwise. For a South African tertiary, educational institution to be accredited and legally registered it must comply with the 1997 Higher Education Act, 2000 Adult Training and Education Act, the 2008 General Education and Further Education and Training Bill, 2012 Higher Education Training Amendment/Further Education and Training Colleges Amendment Bill and qualifications registered with NAQA under the 2008 NAQA Standards Act. Institutions need to adhere to SAQA unit standards framework/moderators, consider any related research funding legislation, civil/criminal law, the 1998 Skills Development and 1999 Skills Development Levies Acts.

Legally, academic accreditation' means [the certification of a person, a body or an institution as having the capacity to fulfil a particular function in the quality assurance system set up by the South African Qualifications Authority in terms of the SAQA Act, 1995. Under the 1997 Higher Education Act, any formally registered institution (whether private or public), is legally empowered to confer degrees, diplomas and other qualifications, admit, examine, discipline (noncorporal), administer, receive funding and possess limited legal liability/protection in certain areas. It can recruit staff, establish facilities, publicise regulation and other ways conduct research, scholarship, education, skills development, training and be represented by the Council of Higher Education on all legal related areas. This is conditional on ensuring correct records and audits, establishing corporate governance and accountability, following laws, establishing a student’s representative council, enabling information access, a source of appeal, academic quality assurance, promoting knowledge, ethical values, rights and the Constitution. The 2000 Adult Training and Education Act provides further legal characteristics that could advantage specific maritime education legislation if enacted; incorporating sections on governance, registration, funding, quality assurance, the role/value of a centralising coordinating institution for stakeholders/institutions such as the Council for Higher Education. SAIMI could represent this on behalf of maritime education stakeholders if legally empowered. Corporal punishment is prohibited but other alternatives exist. Additionally, a specific Maritime Education Act could provide SAIMI/a specialised maritime university to formally defend policy stakeholders on maritime education issues including legislation and policy guidance, quality assurance to the Council and SAQA, stakeholder interests. This could coordinate funding, information, career guidance, a maritime information, innovation, enterprise and knowledge source connecting maritime education/economy providers with Operation Phakisa and the rest of South Africa/Africa. Registered providers also can penalise false institutions/individuals/businesses for fraud including qualifications and misrepresentation.

The 2008 General Education and Further Education and Training Bill empowers colleges/institutions to offer qualifications equivalent to NQV framework 1-4, provided they are legally SAQA accredited. If SAIMI/a maritime education institute wishes to extend beyond degrees, it needs to comply with this bill and quality assurance. South Africa and Operation Phakisa maritime education objectives would be further secured if both SAQA and the Council of Higher Education had specialised assessors/representatives/assistance from a specialised maritime institute. Resource constraints could be partially reduced and simplified if SAIMI/the maritime education, academic representative was delegated the responsibility/capacity to register/monitor private and public maritime qualification/service/related associations/facilities for quality standards. They could also possess the power to affirm/reject accreditation. The Further Education and Training Colleges Amendment Bill further provides advantages for vocational qualifications with colleges, requiring formal curriculums, research, skills development, career guidance and serve as conduits of policy advice. It provides a centralised institution, considers management and professional training, upgrading local/regional sector physical and human capacity.

The 2008 NAQA Standards Act/1998 Skills Development Act are mandatory education requirements where a centralised source can ensure professional standards are maintained, confirming students, faculty, researchers and assessors are experienced, qualified and internationally/domestically recognised for the qualifications to be valuable and resources invested not wasted. It allows for professional skills development. A specialised maritime education institution and legislation would need to implement the 2012 Higher Education Training Amendment Laws. These laws not only updated student capacity to receive/repay from the National Student Financial Aid Scheme (NSFAS) but the power to disestablish an institution via Government Gazette institution. Its most significant legal advantage was the precedent established for the first completely new rather than amalgamated universities in over 25 years –by application to the Minister/Council of Higher Education for the 2 new universities in Mpumalanga and the Northern Cape, providing for separate institutions, which would further delineate responsibilities/powers/privileges, liabilities, constraints and other issues between NMMU/SAIMI and in relation to Operation Phakisa/coordinating other maritime education institutions.

The proposed initial South African maritime research centre SAIMI presently lacks a specific charter, legally binding mandate and bill, unlike the National Research Foundation, CSIR, key parastatals, existing leading universities and other core institutions, without a founding charter as a separate coordinating/higher education centre. This does not provide it with the same advantages and prerequisites/protection as a formally established, South African specialised maritime university/research institute specifically tasked to undertake Operation Phakisa. Legal ambiguity exists as to whether it is co-equal, under Nelson Mandela Metropolitan University’s charter/aegis or otherwise not bound by most of the laws if acting in a coordinating area. However, without specific legislation it cannot consider promoting the quality research assurance of qualifications, assist stakeholders with specialised training/research or conduct experiments/field research projects. It cannot attract funding, recruit researchers, acquire separate students and facilitate other maritime education/training requirements. Substantial legal disadvantages exist without specialised maritime education legislation and an authority capable of enforcing it whilst simultaneously fulfilling other education requirements, stakeholder and Operation Phakisa/African maritime economy needs. If a centralised authority is to be taken seriously it requires legal reassurance of the institution’s permanence and legal capacity –that the state believes in its future, preparing to publicise, protect, fund and support it where possible. This encourages the private sector, students, media, NGO’s, parastatals, other existing and future education and research facilities, funding sources, professional associations and domestic/international connections to believe its credibility and support its future viability.

If this centralised authority is to be of physical value to establishing a real African maritime future and economy it needs to be able to assist, intervene, support, direct and coordinate other maritime education, research, facility and economy stakeholder providers as the most experienced/qualified source, with the legal capacity to do so. Rather than being isolated, it must legally connect itself to them, aiding in information, policy guidance, representing their interests, recruiting students, directing technology/aiding business and anything else necessary to be trusted/consulted by them reciprocally with support. It must also be able to connect to and involve itself with other economic areas and link to African regional needs.

Current legislation disadvantages include under the NAQA system it does not recognise SAIMI as an accredited separate degree/qualification issuing and examining authority, despite its position because of its legal ambiguity and lack of separate autonomy. The current NAQA undervalues certain internationally recognised secondary qualifications specifically the Cambridge A Level, SATS and International Baccalaureate system. It challenges South African/other African students and faculty members from being worth as much. They may wish to be involved even when of a higher professional standard than the South African IEB/state systems – (the latter with pass rates 30/40% is not internationally valued). Foreign university qualifications which slightly differ including leading British universities who complete honours in 3 years whilst South Africa equates to 4. This prevents the straight progression to a master’s degree or the US who take 5 years not 3 for a PHD have been challenged by SAQA before; despite having no legal basis and being perfectly valid. Those with foreign qualifications/scarce skills (despite considerable economic/academic advantage may be discouraged by South Africa’s visa process. This applies especially if they wish to bring their families/young children unless specific clauses/arrangements address this. SAQA may benefit from professional experience/education especially in highly technical maritime areas. This yields the further benefit of a specialised maritime education bill and founding source with the legal capacity/responsibility to assist.

Internationally, few nations have legally committed themselves to securing their maritime futures through enshrined specific legal protection. The UK, China, Russia, Brazil, India, France, Greece, Germany, France, Japan… even Sweden home of the World Maritime University may be global or maritime powers. However, they nor the Malta based, International Maritime Law Institute have nothing specifically related to maritime education law. Despite increasing international preoccupation with the ‘blue’ or ocean economy,” they prefer uncoordinated research, policy, economic enterprise, funding, collaboration and efforts to coordinate stakeholders/reduce legal uncertainty. Denmark considered it but have not publicised guidelines. Australia differed before its repeal of the 1978 Australia Maritime College Act. This act specifically secured the assets, income, faculty, legal protection, council establishment, formation, courses, salaries, audit, records, taxation, curriculum establishment and fundamental existence in perpetual succession as a body corporate whilst preserving academic, financial and physical legal autonomy: Marine Order 506 replaces this with a requirement for any specific marine education service provider to specifically adhere to global/local marine standards including the Australia Maritime College under a National Regulator.

*‘7. The functions of the College are-(a) to conduct an institution for the provision of such maritime and maritime-related education and training as the Council, with the approval of the Minister, determines, or as the Minister requires, being principally tertiary education for persons who wish to become, or are, officers on merchant or fishing vessels or who wish to become, or are, otherwise engaged in connexion with shipping or the fishing industry;*

*(b) To use the facilities and resources of the College to advance and develop knowledge and skills in the fields with which the College is concerned;*

*(c) To award such degrees, diplomas and certificates in relation to the passing of examinations or otherwise in relation to the education and training provided by the College as are provided for by the Statutes;*

*(d) To consult and maintain liaison with other institutions and authorities in Australia that are concerned with the provision of maritime education and training; and*

*(e) To do anything incidental or conducive to the performance of any of the preceding functions.*

*Powers of 8. (1) The College has power to do all things that are necessary or College convenient to be done for or in connexion with the performance of its functions.*

*(2) Without limiting the generality of sub-section (1), the College has power-*

*(a) to enter into contracts;*

*(b) to erect buildings;*

*(c) to occupy, use and control any land or building owned or held under lease by the Commonwealth and made available for the purposes of the College;*

*(d) to employ such staff as are necessary for the efficient performance of its functions; and*

*(e) to accept gifts, devises and bequests made to the College, whether on trust or otherwise, and act as trustee of moneys or other property vested in the College upon trust.*

*(3) Notwithstanding anything contained in this Act, any moneys or other property held by the College upon trust shall be dealt with in accordance with the powers and duties of the College as trustee.*

***9.*** *The College may, in pursuance of arrangements between the College and the Minister for Transport, conduct on behalf of the maritime Commonwealth*

*(a) short courses of maritime training; and*

*(b) examinations and assessments for marine competency in accordance with the Navigation Act 1912.*

The USA 1980 Maritime Education and Training Act ensures that US cabotage and other maritime policy requirements are physically prioritised with appropriate facilities and training/experience /resources. *’The Secretary of Commerce for Maritime Affairs and the head of each State maritime academy, shall assure that the training of future merchant marine officers at the United States Merchant Marine Academy and at the State maritime academies includes programs for naval science training in the operation of merchant marine vessels as a naval and military auxiliary and that naval officer training programs for the training of future officers, insofar as possible, be maintained at designated maritime academies consistent with United States Navy standards and needs*. It specifically reserved key positions from associated neighbouring allies as a proportion to ensure other marine economies and sectors also benefitted from its position whilst enhancing regional connections/ experience. It sought local skills qualification for its navy/merchant marine to reduce foreign dependency. At a legal minimum aside from the tax exemption/other privileges, legislation should include these. If a maritime university and underlying maritime institutions/associations specialising in education, research, skills development, vocational experience and training are to be secured, prioritised and recognised seriously as indispensable for a maritime economy and nation’s future at present; then just as other core facilities and areas including education receive specific guarantees from political/social/economic/legal uncertainty, so similar guarantees need to be confirmed.

Current legislation experiences significant constraints to implementing the following report suggestions. SAIMI/other institutions have no legal authority/overarching mandate to accredit/coordinate or any other way involve themselves with any other maritime education training, legislation, institution, research, stakeholder, maritime project, stakeholder, event, risk, association, funding source or area related to converting Operation Phakisa from dreams to reality. Current maritime education legislation would need to be drafted to consider practical industry partnerships/work placement experience as years in industry. It would need to provide means to simplify international research funding, maritime education, exchange, qualified faculty and guest lecturers/scarce skills exchanges. It would need to find ways to legally accredit entirely new curriculum areas/establish specialised campuses/facilities. Means are sought to improve student/faculty enterprise, and non-academic qualifications including foundation programmes to ensure previously disadvantaged students are domestically and internationally competitive. SAIMI could receive a legal mandate to specifically conduct projects connected to future maritime areas including risks/uncertainty and with the ability to access/represent to key government/other stakeholders to be of utilised value. It could conduct community education, outreach and awareness programs/employ media relations whilst ensuring students can conduct field research with local pilot projects/research area needs/gain experience and access; with the right legal capacity.

**RECOMMENDATIONS:**

* SAIMI receives a specific legal founding charter and bill to permanently secure its future along with any subsequent specialised maritime education/research centres and economic parastatals. This contains the above legal/other advantages/principles whilst avoiding/minimising disadvantages.
* South Africa as a prototype for Africa endorse, draft and enact a specific Maritime Education/Research Bill including vocational training. This specifically empowers SAIMI and other maritime education institutions with common, consistent standards, legislative framework, jurisdictions, responsibilities and areas above to facilitate Operation Phakisa, a maritime economy, international standards, national development and other priorities as in this report
* Any legislation is drafted with stakeholder consultation including MLASA, publicised and considered binding upon related domestic/foreign registered stakeholders, institutions and facilities related to maritime education/marine economy.
* The 1983 Admiralty Jurisdiction and Regulation Act/existing above educational and other legislation is amended to incorporate these bills/maritime education/SAIMI specifically where applicable.
* Ensure SAIMI/equivalent is involved in SAQA accreditation and the visa process is simplified to expedite scarce skills/qualifications/experience/funding for the maritime sector.

## CHAPTER II: THE IDEAL CURRICULUM FOR OPERATION PHAKISA AND AFRICA’S MARITIME FUTURE

This section provides the overall curriculum outline that any central maritime university/coordinating centre and supporting educational institutions could consider to train future students, faculty and researchers in existing and emergent maritime research areas. This is summarised in Table I: It provides a succinct, projected course outline, summarises existing institutional capacity within South Africa where accessible. It identifies areas requiring future research/education/funding/facilities, opportunities, projected qualifications and professional associations (where applicable) and how providing this qualification can assist South Africa/Africa under Operation Phakisa. Maritime education would also have to consider examinations, qualifications, student/faculty management, finances, insurance, health, safety, legal, environmental, business, education and other factors applicable to all educational institutions and business enterprises.

Table I: Overview Of The Ideal Maritime University Curriculum For Operation Phakisa

|  |  |
| --- | --- |
| Antarctic Science | Maritime Health# |
| Aquaculture, Fisheries | Maritime History |
| Aquatic Security#, Conservation# and Engineering | Maritime Law and Diplomacy, Admiralty Law, Customs, Carriage of Goods by Sea, Charterparties, Environment, Safety |
| Astronomy and Space/Space Economy# | Maritime Law Enforcement/Coastguard# |
| Cabotage/Registration# | Maritime Security#, Cybersecurity, IT |
| Climate –Climate Change. | Maritime Philosophies# |
| Cruise, Marine# and Ecotourism | Maritime Psychology# |
| Human Factors –maritime psychology/skills etc. | Maritime Technology# |
| International Trade, Logistics, Business and Administration, - (Maritime Business#) | Maritime Warfare |
| Marine Biology/Ecology/Science/Conservation | Naval Architecture, Shipbuilding, Salvaging and Repair, |
| Marine Contact# | Nautical/Ocean Engineering –Ocean Renewable Energy# |
| Maritime Archaeology# | Navy/Merchant Navy |
| Maritime Art, # Cuisine#, Culture#, Vocational Craft# | Oceanography, Ocean physics, chemistry |
| Maritime Communications# | Ocean Popular Understanding and Enlightenment# |
| Maritime Economics/Port Economics/ Port Pricing#, | Uncertainty and Maritime Futures# |
| Maritime Education#, | Seafaring -Pilots, Tugboat Operators, Navigation |
| Maritime Engineering | Submarines# |
| Maritime Finance# | Surveying |
| Maritime Geography | Underwater photography, Diving, |
| Maritime Hazards, Risks and Failures# | Watersports –Maritime Sports research/training# |
|  | Yachting/Recreational Boating |

# Emergent Research Areas (see following sections), several authors developed neither taught in Africa nor professionally/thoroughly established abroad proposed by this research.

## 2.1: Antarctic Science

Globally, few specialised polar training institutes exist under the Council of Managers for Antarctic Research Programmes and Scientific Committee for Antarctic Research. South African proximity to Antarctica, its specialised SA Agulhas research vessel, academics and SANAE base offer further chances for its maritime education to compete once a dedicated maritime university/coordinating centre and curriculum/qualifications are developed. South Africa also hosts meteorological bases on Marion and Gough Islands. There is no current specialised education facility/programme. Training often involves practical immersion/experience from country programmes/divisions but without any formal qualifications/guidelines/expectations. South Africa could therefore compete with New Zealand/ Uruguay/Chile/Argentina Antarctic Research Institutes, or the University of Tasmania’s Institute of Marine and Antarctic Studies/International Antarctic Institute and the Australian Antarctic Cooperate and Ecosystems Research Centre. These have traditionally targeted vocational training to prepare people to reside there and scientific research.

SANAE currently focus on space and geophysics; climate variability biodiversity and ecosystems; sustainable engineering and history/sociology/politics. Each base expedition involves 14 months for 1 doctor, 2 diesel mechanics, 1, electrical, 1 mechanical and 1 electronic engineer plus several meteorologists and field researchers, which could be extended to enable greater experience. Vocational training involves cooking, first aid, search and rescue, firefighting, equipment, general living, psychology and heavy vehicle driving. SANAE could further work with the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) on monitoring vessels, fishery intrusions and preserving species around Queen Maud Land/Ross Shelf and Southern Ocean. It could partner with others to further reduce carbon footprints. It could learn from Australian Antarctic Division training, which familiarises expedition participants with vessel/aircraft safety/risks; not just the base itself. It includes navigation, orienteering, hiking –sea ice and glacier travel, communications, power systems, camping, self-rescue, safety and environmental responsibility. This report proposes simulated facilities replicating conditions/species familiarisation at aquariums etc at a specialised research and training centre base for SAIMI/SANAE in Cape Town or equivalent.

The University of Tasmania as the base of several specialised centres in Hobart, have researched the following emergent topics including ecosystem/marine environment, oceans, cryosphere and climate. It has emphasised linking humanities to Antarctic Science, improving ocean governance and law enforcement, species security and biotagging, ocean-ice geophysical interactions, climate extremes and hot spots. The Australian Antarctic Cooperate and Ecosystems Research Centre has concentrated on Ice Sheet, chemical and biological changes. South Africa could offer certificates, diplomas and degrees in polar science/research, as the Universities of Tasmania/Canterbury do. These cover Integrated Marine Management and Conservation of Antarctica, Southern Ocean Zooplankton

Advanced Phytoplankton Methods, Marine Bio-Telemetry, The Antarctic Environment, Molecular Marine Ecology, Birds and Mammals of the Southern Ocean, Oceanographic Methods combined with a practical Antarctic and Southern Ocean Internship. Uruguay is improving asset tracking, infrastructure and facilities under polar conditions. New Zealand are trying to devise means of improving the continent’s value, reputation and physical security against those perceiving Antarctica as being of limited relevance and need in its pristine, peaceful, permanent human free, ecological sanctuary, neutral zone status. They are considering the implications of pollution/human presence on sensitive polar environments and ecosystems and specialise in volcanoes. Chile is researching continent microbiology, palaeobotany, marine biology, ecology and glaciology, adaptation and improving educational awareness.

Although not officially recognised as a core part of Operation Phakisa, this report proposes a future area towards an African maritime economy and education system. It could offer specialised training, grants and internships to enable fellow African countries to discover, learn and benefit from Antarctica, whilst representing the strategic interests of our continent in relation to potential risks, research priorities and opportunities. The Polar Regions are forecast to become increasingly paramount as worth attention, especially over tensions to preserve its neutrality, untapped resources, scientific research freedom, freedom from commercialisation, permanent migration and settlement, ecological sanctuary status and physical risks presented by climate change. These present research/curriculum areas that South Africa as the only African signatory since 1958 to form one of the 12 treaty parties with a scientific permanent base, has to consider. As a country it needs to consider threats to coastal regions, navigation, marine environment, resources and territory –including Marion, Gough and Prince Edward Islands as we border the Southern/Antarctic Ocean. Other emergent areas to target include whether increased cruise vessel/aircraft/land tourism volumes are ecologically/practically sustainable; implications of species migration/biodiversity; international law/sovereignty and local geology/geography/ecosystems and climate. A future area not evaluated includes polar economics –the costs versus benefits of maintaining a base –including comparative values of research/ecological protection against logistics/other expenses. It includes considering improving foreign relations/partnerships among other bases. From a commercialisation perspective; this report considers that polar region exposure/training, equipment and product development could occur. South Africa could adapt adventure/expedition/other gear and equipment to polar climates –developing exports to Canada/Russia/other areas –using those at the base to test samples. This would minimise import substitution of equipment/infrastructure etc. It could improve acclimatisation conditions. Specialised maritime training could improve safe polar navigation for errant vessels. It could ponder health/psychology effects –rotating armed forces/emergency services/scientists etc to gain experience and consider implications of maritime law enforcement within EEZ’s. With few other vessels devoted internationally, South Africa could propose a naval squadron/task force to monitor Southern Hemisphere Oceans including this polar region. It could improve existing ocean, space, land and aerial surveys and charters/technology.

## 2.2: Aquaculture/Fisheries

South Africa’s existing institutional aquaculture capacity includes universities, colleges, public and private research companies summarised in Table 4. AGRI-SETA also are establishing general vocational aquaculture training and qualifications for Operation Phakisa pilot projects including hatchery, operations, farm management, commercial expansion and project management skills.

Table 2: South African Aquacultural Education Facilities

|  |  |  |
| --- | --- | --- |
| **Institute/Company** | **Faculty/School** | **Qualification/Subject** |
| Stellenbosch University: | Department of Animal Science | BSc (Agric) with majors in Aquaculture and Conservation /Aquaculture and Animal Science. |
| Rhodes University | Fisheries/ Ichthyology  Department of Genetics | BSc of Science in Fisheries Science/Ichthyology  Aquaculture Certificates/Courses  -DAFF, vets, agriculture extension |
| University of Cape Town | Botany and Zoology Departments | Postgraduate courses in aquaculture. |
| University of Western Cape | Botany and Zoology Departments | Postgraduate courses in aquaculture. |
| University of Kwa-Zulu Natal | Microbiology Department – | Postgraduate courses in aquaculture microbiology |
| University of the Free State | Ecology | Freshwater Ecology –UG  Aquatic Parasitology –PG |
| Nelson Mandela Metropolitan University | Zoology Department | BSc Aquatic Ecology  BSc Applied Aquatic Science |
| University of Limpopo | Science Faculty, Aquaculture Research Unit – | Freshwater finfish |
| University of Zululand | Zoology Department | Various aquaculture modules |
| Cape Peninsula University of Technology | Department of Biodiversity and Conservation | Various aquaculture modules –PG/UG |
| **Private Sector Training** |  | Short Courses |
| Agri Academy |  | Export related courses/HACCP training. |
| Aquaculture Innovations |  | General courses |
| WESGRO |  | Beginner’s/Advanced Exports |

However, these have primarily concentrated on technical/ecological aspects rather than exploiting the economics/commercial potential of aquaculture, the objectives of Operation Phakisa/African maritime economy, stakeholder requirements, reducing climate change risks, improving food security and other key/emergent research areas. To empower students, researchers, businesses, individuals, communities and other aquaculture value chain, potential stakeholders to achieve prosperous, sustainable aquaculture under Operation Phakisa, the research curriculum should consider at a minimum the following aspects summarised in a previously authored report: ‘***Harvesting the Coastal Sector: The Potential Future of Aquaculture for South Africa’s Maritime Economy’.*** The curriculum would define aquaculture and related stakeholder requirements for any who wish to participate in it. It would outline production processes, economics, ecological issues, species characteristics and health, marketing, business, storage, transport, distribution, financing options, laws and how to become a part of the aquaculture value chain. Candidates would learn different market structures, customers, target markets, publicity, historical successes and failures, to reduce maladaptation. They would learn African/South African historical, current and future aquaculture efforts, policies and environment issues, especially considering how to register and legitimately benefit. They would be able to consider projected economic, environmental, education, health, cultural, climate and other advantages, disadvantages, risks and opportunities to ensure potential successful aquaculture if interested.Education would be combined with physical work experience opportunities/domestic and international academic exchange to gain practical experience from existing and pilot projects. African case studies/business plans would be pursued as most relevant wherever possible

The direct implications of Operation Phakisa and establishing aquaculture in South Africa/regionally in Africa would be endorsed to motivate students throughout. Aquaculture implications would be highlighted to students in other courses where appropriate including maritime law, climate change, marine ecology, maritime economics, business, trade, logistics and administrationand other curriculum sections so each stakeholder is encouraged to understand the implications of indigenous aquaculture policies. International aquaculture capacity exists but given our existing capacity and yet comparatively few graduate students it would make sense to send students for placements abroad to specialise in global aquacultural areas for which we do not have local capacity/skills or a comparative advantage. For example, South Africa could gain experience of different species types, climate and environmental conditions, upgraded technology and modernisation processes/ establish improved laboratories, medicine, fish feed/other key inputs/outputs. Establishing placements and partnerships regionally in Africa would enable African aquaculture experience to be transferred.

Current research has focused on myriad areas. However South Africa would benefit from prioritising areas related to improving marine ecosystem security, literacy, resilience, survival and value via aquaculture. It gains most from species health and knowledge, value adding/export increase and import/input substitution facilities, pharmaceutical potential, species health, improving commercialisation/economics, marketing, storage, existing product quality, quantity, storage and transport capacity, business and commercial law/policies awareness. It could concentrate on unique species/biodiversity and increasing public awareness to stabilise demand and supply. Africa would gain from concentrating on its own requirements –climate change, food security/diseases, establishing sustainability and export growth/research for localised marine ecology and value adding along with the value of both professional/recreational fishing and community aquaculture stakeholders. Existing opportunities include expanding into Africa/Southern hemisphere, establishing marine reserves, investigating local and foreign species implications in further pilot programmes. E.g. reviving hatcheries, promoting water security/quality, health products, the ornamental market, improving recreational/game fishing. Projected aims include eventual internationally recognised specialised qualifications in all section mentioned areas –undergraduate, postgraduate, research and basic skills/vocational/ community developed courses/technical education and key skills.

Existing local professional associations that could assist in devising the optimal aquaculture/fisheries curriculum include the Aquaculture Association of South Africa, the Abalone Farmer’s Association of South Africa, the Marine Finfish Farmers Association of South Africa, the Mpumalanga Trout Forum, the Western Cape Trout Association, SANCOR and the Marine Farmers’ Association of Namibia. International associations extend to the World Aquatic, Vetinary Medical Association, the World Aquaculture Society, Marine Education Society of Australasia, Global Aquacultural Alliance, International Association of Aquaculture Economics and Management and Marine Stewardship Council. Aquaculture also has potential research advantages to contribute to knowledge in aquaculture; ecology, health, nutrition; maritime; climate change to specialise in indigenous species; expand technology and experience. Aquaculture improves other skills/education along with environmental awareness. Specific skills and training aquaculture could potentially provide include asset fixing, repair, maintenance, construction, nutrition, aquatic/human and environmental health, promote rural soil, water, afforestation, conservation, water/resource/ecological conservation, plus general management, marketing and business skills. This can provide a source of recurrent employment for unskilled labour with little mechanisation or formal education required for many projects and production/processing stages. Another potential advantage towards South African aquaculture includes tourism for rural tours of projects/cafes including minibuses to convey people from urban centres, combined with other rural visits as a tourism tour opportunity. Commercial aquaculture products for sale could be sold retail as gifts such as pearls and jewellery from oysters, chutneys/spreads e.g. Peck’s Anchovette. Social advantages of developing aquaculture include potential crime and poverty reduction for those employed and those economically dependent but also lower food prices for consumers.

Developing aquaculture would complement Operation Phakisa via the 2012, National Aquaculture Strategic Framework. President Jacob Zuma in Durban, (October 2014) identified the potential of the “blue” maritime economy for South Africa – particularly for the rapid emergence of aquaculture, devoting R500,000,000 towards an Aquaculture Development Fund and 24 pioneer projects. It is identified as an industry of the future in South Africa’s 2013 Industrial Action Policy Plan and R850,000,000 Aquaculture Development and Enhancement Programme. The African Union echoed this vision 8 months earlier with the 2050 AIM (Africa Integrated Maritime) Strategy, seeking to independently establish a future African maritime economy. The maritime centred city of Durban and province of KwaZulu-Natal’s Planning Commission in 2013 introduced an Integrated Maritime Industrial Strategy for KwaZulu-Natal. Apart from a 2013 revised, Aquaculture legislative framework to reduce legal uncertainty, there is also an Aquaculture Value Chain Roundtable proposing to integrate aquaculture stakeholders.

As South Africa currently possesses a shortage of skilled aquacultural industry labour and technocrats, a significant risk towards the future of aquaculture, the current lack of training and subsequent need for such training to assist South Africa/Africa. This training demand would be assisted through modernising agricultural extension services with updated knowledge and funding access; including basic artisanal maintenance but also maritime engineering for more complex projects such as salmon farming. A centralised, aquaculture maritime centre could aid communities by a proposed agricultural extension service to train in productivity/ efficiency; resource conservation; eco literacy; fish biology, climate; nutrition, risk management/ business opportunities/ marketing, records; communication and business skills. These become even more essential to ensure equity, environmental and economic externality costs are minimised from previously disadvantaged communities/individuals for the rural piloted projects outlined. Aquaculture supply chain stakeholders would benefit from improving resource management, to provide mutual cooperation for information, communication and emergency response, minimise adverse externality costs. Existing and future new local universities such as the University of the Northern Cape/Mpumalanga and vocational/FET (further educational training) colleges could offer more courses and develop research on aquaculture skills development, research and technology (for example in aquatic health/nutrition).

## 2.3: Aquatic Security#, Conservation# and Engineering

This reflects another pioneering research area that will become of increasing significance not just to the maritime economic and education sector but globally to all affected life forms that depend upon it. Although regarded as a Scarce Skill with several institutions, few prospective students/academics/ entrepreneurs have yet to appreciate its opportunities. This report proposes additional emphasis via Operation Phakisa may motivate water’s vital significance as a topic. Current institutional capacity for water education generally depends on plumbers/vocational training, engineers and community initiatives, seldom provided as separate courses/researched separately. In South Africa, it includes institutions summarised in Table 3. Any related course needs SAQA accreditation and benefit from links to the professional Engineering Council of Southern Africa/ Water Institute of Southern Africa and the Young Professionals Water Network, internationally recognised and regarded. Given the below reasons, the ideal curriculum/university should consider aquatic security, conservation and engineering, as the quintessential element that affects all maritime sector and stakeholder aspects. Climate change and increasing human population/economic extractive growth, will pressurise Earth’s existing aquifers dramatically.

Table 3: South African Water Engineering Training/Research Facilities

|  |  |  |
| --- | --- | --- |
| **Institute/Company** | **Faculty/School** | **Qualification/Subject** |
| Stellenbosch University: | Civil Engineering  Water Research Institute | Water and Environmental Engineering –B, M, PHD |
| University of KwaZulu-Natal | School of Engineering | Water and Environmental Engineering |
| University of Cape Town | Engineering | M (Engineering) MSc Water Quality Engineering |
| Durban University of Technology | Institute for Water and Wastewater Technology | Postgraduate courses |
| Monash University |  | Postgraduate Diploma in Water Management |
| Central University of Technology | Civil Engineering | BSc Hydrology and Water Resources Management |
| Nelson Mandela Metropolitan University |  | Only as a course under Civil Engineering |
| University of Pretoria | Water Institute | Water Utilisation Engineering |
| University of Witwatersrand | Engineering | BSc –Water Engineering |
| Cape Peninsula University of Technology | Civil Engineering | B Tech Water/Transportation/ Urban Engineering |
| **Private Sector Training** |  | **Short Courses/Diplomas** |
| Damelin College | National Certificate | Water and Wastewater Treatment |
| Intec College | National Certificate | Water and Wastewater Treatment |
| Abems Training Institute  Aque Zone Trading 2015 Projects  Cypress Creek Investments  Marematlou Trading  Rand Water Zwartkojies Training Centre  Regen Technical Institute  SSD Consultants  Uluju Technology Investments | SAQA Further Education and Training Certificate: | Water and Wastewater Treatment Process Control Supervision |
| None current –SAQA listed | National Certificate | Community Water, Health and Sanitation Monitoring |
| None current –SAQA listed | National Certificate | Industrial Water Treatment Support System Operations |
| Abems Training Institute  Aque Zone Trading 2015 Projects  Cypress Creek Investments  Dintshang Trading  Lekgathe Investments  Marematlou Trading  Matukane and Associates Pty Ltd  Municipality Infrastructure Solutions  Murlbaton Investment and Projects  Networx for Career Development  Ngumendlana Trading Enterprise Pty Ltd  Nhuma Construction and Projects  Ntsangalala Business Enterprise Pty Ltd  Rand Water Zwartkojies Training Centre  Regen Technical Institute  Resisa Logistics  South African Institute of Leadership Management  South Rand Academy of Hospitality  SSD Consultants  Tovani Trading  Uluju Technology Investments  WCEM Projects and Training |  | Water and Wastewater Treatment Process Operations |
| Water Academy | N/A –general | water/wastewater reticulation and process engineering |

The Water Management Institute is currently addressing myriad water uses, (as are the above programmes). Its highlighted concerns include water and ecosystems/environmental flows; floods and droughts, food security, gender, groundwater, climate change, irrigation, migration, multiple uses; resource recovery and reuse; wastewater, water security, quality, footprints and health; sustainable development goals, access, storage and wetlands. However, these have yet to consider improving water literacy/conservation and other skills in partnership with those above, sufficiently for individuals, communities, businesses and other stakeholders to preserve water security for Operation Phakisa and other national development objectives. Existing and new facilities could align with SAIMI/ or an equivalent to extend our existing triumphs in water management such as the RDP extension to millions under the ANC government and Minister Kader Asmal to other African countries. It could ensure water needs are preserved and research, skills and jobs are there. Greater scope for practical projects including communities, technology and business development/networking could be prioritised extending beyond UKZN’s 14 week internship course requirement.

Water represents one of the scarcest, most essential and yet paradoxically undervalued, under-rated of all resources. It’s comparative abundance or scarcity determines whether not only can Operation Phakisa transcend from dreams to reality, but whether South Africa and the human race could continue to exist… at anything remotely approaching the current economic and human population growth rates. Droughts and heatwaves represent South Africa and the African continent’s most pivotal environment and climate change risk, apart from sea level rise. This area would incorporate engineering, plumbing, marine conservation, urban planning, agricultural, law, architecture, science and technology. Each of these areas are advised to receive a single course related to ensuring water security, given multiple priorities and values for water. This would improve water security, limit potential conflict and minimise disaster impacts such as the 2015/2016 Southern African great drought. This would simply aim to minimise water loss, maximise water efficiency/security and enhance the availability of extracted/stored and distributed water. It would cover cost reduction/recycling/appropriate laws and regulation guidelines. Courses could involve community projects, individual consumers, retailers, industry, agriculture, trade, vessels –especially ballast water, the media and aquaculture. Research could focus on rainwater harvesting, improving water quality, identifying key water infrastructure asset/systems conditions –resolving flaws beyond Operation Phakisa. It would investigate hydroelectric and ocean renewable energy/ desalination and other civic engineering possibilities.

Globally undervaluing water contributes to its continuous loss. Current world attention focuses on food security but not the water requirements of trillions of species and over 7 billion humans. With 97% of global water supplies in the oceans, 2% in ice and 1% decreasing in freshwater with every aquifer generally chartered/tapped/considered but comparatively fewer secure against human, environmental and climate change risk pressure; without developing water security; many achievements will evaporate. Existing stakeholders including engineers, architects and plumbers do not consider its future survival. So many continue to waste it simply because it is generally free or below market/environmental value. Current institutional capacity and curriculums only focus on ensuring physical water capacity, undertaking functional maintenance –assuming that water will remain. Yet without considering risks, with multiple competing interests from mining to golf courses in deserts; this report considers significant threats to the future of global economies, communities, environments, health, productivity and survival. In forthcoming years aside from determining physical survival and economic growth; aquatic security will become increasingly a matter of social, legal, political and economic concern over ownership rights. Future aquatic security will have to determine to whom water rights should be extended to, whether free/ highly subsidised water is sustainable and does existing law adequately protect water sources? Therefore, to preserve Operation Phakisa’s legacy; a maritime centred curriculum and qualifications could promote the need for aquatic security in engineering, architecture, law, business, communities, industry agriculture, trade and aquaculture for entrepreneurs, citizens, government workers and skilled technical operators. This is far more likely to ensure a secure water future locally and beyond our borders.

## 2.4: Astronomy and Space/Space Economy#

South African ambitions to develop a space economy can connect with Operation Phakisa, a marine economy and education future via specialised training, research, qualifications, funding and facilities, where no global maritime education provider is competing. No current institutional capacity exists. This report considers it possible to synergistically connect both sectors simultaneously as a forthcoming priority for SAIMI/any equivalent maritime research centre, curriculum and implementer of a maritime economy. This author proposed in the first independent, African space economy paper: ‘***Expanding Our Celestial Horizons,’*** significant opportunities exist in linking satellites, improved probes and other technology. These can identify maritime risks, more accurately determine maritime financing/insurance, spatial planning, improve law enforcement/customs; enhance trade, monitor and protect marine ecosystems/health. This could improve biodiversity, protect against dumping, overfishing, resource exploitation and poaching. It could concentrate on survival research and extremophiles –understand marine life. Most significantly it could target maritime and space risks that may affect South Africa/Africa from a Madagascar cyclone/tsunami to the melting of Antarctic ice.

In ‘***Devising a Future Space Strategy for South Africa,’*** this research proposes space research, technology, education and businesses can improve benefits to the maritime sector with potential to aid aquaculture monitoring, aquatic/coastal surveying and exploration, maritime conservation and governance. Space technology could monitor/ improve locally registered vessels under cabotage/cruising. Maritime satellites could be established to support maritime navigation, safety and education/training, given the hazards of the South African/Namibian coastline and monitoring Durban, Port Elizabeth, Saldanha, Richard’s Bay and Cape Town as among the most significant ports in Africa/the Southern hemisphere. Aquatic security, conservation and engineering, securing water could be enhanced through improving inspections/reducing faults. Monitoring water uses to promote conservation and maintain infrastructure would also preserve one of our most threatened and precious commodities. Therefore research/training needs to be updated to reflect the role of space as interactive. This ever-changes risk management to ensure not just environmental sustainability and security but proactively anticipating threats to survival in the forthcoming century. It is essential to monitor both existing assets and future infrastructure/investment projects of significance and offer space related products/services to ensure these are viable and survive. Observing maritime and terrestrial environments climate through greater atmospheric, ionospheric, magnetic and space weather research including the ozone layer in Antarctica may further assist this. Few African or Southern Hemisphere rivals who possess South Africa’s Southern Hemisphere competitive advantages can answer. Additionally, it could concentrate on pre-emptive deterrence in border security both for monitoring migrants but also for poaching and smuggling through satellite imagery and automated probes, especially to counter South Africa’s abalone, seafood and rhino plague perils.

Economically, South Africa could shift from concentrating on existing information, aerospace industry and satellite achievements to policies of import substitution, to reduce dependency on access to foreign space satellites, telescopes, research, infrastructure, technology, software, information, products and services. This further establishes a local space industry economy with maritime applications. For example it could promote improved satellite/GPS navigation and monitoring, micro-satellites and nano-satellites. A significant number of advantages exist, primarily through endorsing satellite technology for providing information, facilitating communication, broadcasting, environmental studies and land use, aviation and aerial photography, mapping and surveying (through remote sensing). This report adds engineering, climate change, meteorology, providing early warning, monitoring and adapting to emergencies, disease epidemics and natural disasters plus others. Research benefits include works on the perils of space weather, understanding geomagnetism and even Antarctica. Developing these potential opportunities and risks further assists other prime maritime sectors; expanding our range of education/other exports that can be marketed to other African countries, whilst linking any proposed African space academy/research institute to prioritise the requirements of the maritime sector. Relevant institutions, aerospace/other industry partners could work with the South African National Space Agency, the drivers of Operation Phakisa and others simultaneously to address mutual stakeholder requirements, offering qualifications.

## 2.5: Cabotage/Registration#

Currently cabotage is not taught as a separate research topic whether in South Africa, Africa or internationally. To ensure students become successful cabotage stakeholders under Operation Phakisa, this report proposes the following course outline/objectives under a previous authored submission: ‘***Cabotage and the Future of Southern African Shipping’***. Stakeholders would first have cabotage defined to understand it, related stakeholder requirements, how to become a part of it, historical successes, failures, laws and policies, financing and business models internationally, (whether crew, owners, administrators, lawyers or otherwise). They would learn existing African/South African history and the proposed cabotage laws/local, regional and international policies proposed/how to register. They would be able to consider projected advantages, disadvantages, risks and opportunities to ensure potential successful cabotage if interested. Education would be combined with physical work experience opportunities to consider achieving actual cabotage involving SA Navy, Transnet, Safmarine, Grindrod/sympathetic areas –corporations etc, research African case study and business plans potentials. Smaller courses would link to seafaring/business and other curriculum sections so each stakeholder is encouraged to understand the implications of indigenous trade/shipping policies.

However, providing this qualification would ensure South Africa/Africa would be able to satisfy Operation Phakisa requirements as no specific existing education and training facilities currently exist for stakeholders to exploit /implement existing and proposed cabotage policies, resources and chances, substantially diminishing its prospects of success. The African Union (AU), through its 2009 African Maritime Transport Charter objectives include ‘promoting the establishment of national and regional shipping lines and provide them the assistance necessary for their success (Article 8) including legal policies, cooperation, financial incentives and a dedicated specific fund (Article 13). The African Maritime Charter commences by **‘***recognising the role of maritime transport in the facilitation and development of trade between Africa and the rest of the world as well as the need to implement an effective maritime transport policy with a view to promoting intra African trade’****.*** Under Article 13.1: **‘***In promoting Cooperation among African Shipping Lines, the Charter encourages adoption of national policies, regulations and programs that attract public and private investment in ships and shipping in general.’* The 2012 African Union, Africa’s Integrated Maritime Strategy, specifically challenges governments to support African merchant fleets and become world leading maritime powers by 2050. Article 3: 1 states Africa to “Declare, articulate and implement harmonised maritime transport policies capable of promoting sustained growth and development of African Merchant fleets.” The SADC Protocol on Transportation, Communication and Meteorology (Article 8.2) seeks a consistent, coordinated maritime and inland waterway cabotage policy including the promotion of ship owning, ship registration, ship operations and slot chartering, the growth and development of a viable SADC Merchant Shipping Industry, including the role of concessions and incentives to improve competitiveness, tonnage capacity in member states, including enhanced use of coastal shipping and feeder services and endorsing joint ventures and alliances between ship owners to promote economies of scale, similar to the international liner pooling arrangements. Locally, South Africa is currently reviewing its historic position of avoiding cabotage through potential Cabotage Laws, which more clearly articulate Operation Phakisa (October 2015). The KwaZulu-Natal provincial government has prioritised cabotage as part of an Integrated Maritime Strategy. The South African Maritime Safety Authority (SAMSA 2013) proposed utilising African cabotage. This would enable Africans to avoid historic failures becoming crew, ship constructors, ship financiers, lawyers, administrators, shipowners and African owned cargos/trade routes. Although no specific cabotage association exists, being connected to international maritime law, SAMSA and MLASA are the most relevant South African authorities.

## 2.6: Climate –Climate Change.

What will global climate change really mean for a world increasingly dependent upon seaborne trade, globalisation and supply chains? How much will it cost? Do we retreat; adapt or surrender? For the global maritime sector, virtually all economic activity and development, key stakeholders and physical survival are vulnerable to this increasingly significant risk affecting the continuance and future of seaports, shipping, coastal ecosystems and communities. And yet maritime education and supply chain/economy stakeholders from producers to ports, shipping, government, private sector to consumers have completely ignored its most significant, uncertain future risk with limited research, no legislation and few specific, effective actions/case studies. Although not taught in Africa or globally nor a specific part of Operation Phakisa, this report proposes specifically concentrating on climate change awareness for all maritime stakeholders as a fundamental course/research areas. This involves persuading all stakeholders to be ecologically sustainable. We must /be prepared for forthcoming risk/uncertainty –so Africa can outcompete and out-survive.

The projected course outline following an authored pioneering, PHD thesis and intended future research area, will enable stakeholders to identify and estimate projected climate change risks, calculate associated impact costs, identify which risks to prioritise, when, where, how and why. It will enable stakeholders to identify constraints to adaptation, climateproofing mitigation and adaptation strategies, how to exploit opportunities and develop/market in the green economy. It proposes developing awareness of climate change/disaster risk management local and international research sources and legislation. It advocates research/courses concentrate on developing successful case studies, projects, technology, awareness and other sources, establishing successful project management skills, outcomes and funding applications. Although no specific maritime related professional associations have prioritised adaptation, several have considered mitigation (IAPH, World Port’s Climate Initiative) to align a curriculum towards assisting increased resilience/lower vulnerability of Operation Phakisa, maritime projects, stakeholders, infrastructure and ecosystems. Stakeholders could liaise with existing/proposed climate change researchers, media, NGO’s and community initiatives

## 2.7: Cruise, Marine and Ecotourism

Cruise, marine and ecotourism are not currently taught in South Africa/Africa either separately or under existing tourism/hospitality/business administration/maritime law and other educational/skills development and training programs. However, if potentially developed it could provide wages, pensions and employee compensation to locally trained South Africans/Africans in the maritime logistics, business and tourism/hospitality/retail industries, whether employed as crew, part of the value chain or on shore administration by the company/customs etc. This indirectly supports the viability of colleges, schools and universities including the Universities of Cape Town, Western Cape, KwaZulu-Natal, Durban University of Technology, Nelson Mandela Metropolitan University, Mangosuthu University of Technology, Regent Business School and SA Maritime School and Transport College; within a cruise destination’s vicinity, providing equivalent land-based skills transferable to cruising. This promotes local content and education/training especially given existing familiarity in South Africa not just with tourism but with cruises. Course demand would particularly benefit cruise terminal operatives, shore administration, tourism sector, local shipping lines, aspirant crew, passengers and businesses. It could aid tiers of government –Departments of Transport/Tourism/Environmental Affairs, port authority, customs/police, Transnet, professional associations and international/domestic cruise lines. To enable students/researchers/businesses to become successful cruise tourism and value chain stakeholders under Operation Phakisa, this report proposes the following course outline/objectives under a previous authored report: *‘****Cruising and Cruise Ships as Tourism Gateways into African Shores?’***

Stakeholders would first have cruising defined to understand it, related stakeholder requirements, how to become a part of it, the purpose of cruising, key target markets, economics and characteristics. They would understand the optimal terminal design; key maritime geography characteristics which ensure an attractive cruising destination port, cruise pricing/marketing incentives, local and international applicable laws/regulations. Stakeholders would understand different target population/destination markets, be aware of historic successes and failures of cruising across Asia and the Orient, Africa, the Caribbean, Oceania and the South Pacific including financing and business models internationally whether crew, owners, administrators, lawyers or otherwise. They would learn existing African/South African history and proposed cruise related guidelines/incentives/community implications and awareness. They would be able to consider projected advantages, disadvantages, risks and opportunities to ensure potential successful cruising if interested. Education would be combined with physical work experience opportunities to consider achieving actual cabotage involving MSC, occasional callers and any /sympathetic emergent firms along with researching African case studies and business plans potentials. Future cruising trends would be identified Smaller courses would link to business and other curriculum sections so each stakeholder is encouraged to understand implications of indigenous cruising policies towards African cruise lines, African cruise crew, repairs, modernised terminals and an enhanced cruise value chain economy presence. This maximises local procurement/potential attracting increased vessels where sustainable.

Currently, cruising and marine tourism has not been considered an official direction of Operation Phakisa. The inaugural 2012 Cape Town, South African Maritime Industry Conference and KwaZulu-Natal Department of Economic Development and Tourism 2013, *‘KwaZulu-Natal Tourism Master Plan,’* only briefly mentioned maritime tourism and ignored the cruise sector. The South African National Department of Environmental Affairs and Tourism, ignored it when developing tourism in the 2011 National Tourism Strategy and a 2012 report. South African National Department of Transport, 2015, *‘Strategic Plan 2015-2019,’* 2011, *‘South Africa Maritime Transport Sector Study,’ and* 2008, *‘Draft South African Maritime Transport Policy,’* ignore cruising. However, passenger liners and Durban, Cape Town city familiarity with maritime tourism date back to Union Castle and the 1870’s. Although not fully developed into a specialized cruise terminal yet (Gretton) 2008 Cape Town called for implementation of its 2004 Tourism Development Framework which identified the cruise industry for future growth. Yet only Durban has a dedicated cruise terminal, specific marketing and research to consider it. The Ethekwini Maritime Cluster also hosted its first annual Maritime Summit Cruise Conference to specifically support the industry. Durban proposed to appoint consultants for a cruise industry value chain analysis (Ethekwini Municipality, 2014, Nala 2016) and Urban-Econ Development Economists (2014) added cruise tourism to its development of an integrated maritime strategy for KZN. A KZN and national cruise tourism strategy has also been proposed by stakeholders though not formulated completely as emergent interest develops. Durban’s proposed port expansion at the old International Airport site also offers potential for upgraded cruise terminal facilities and revenue to regenerate Durban’s future maritime tourism prospects (Transnet Ports Development Framework, 2012). Professional associations to considering designing a curriculum include Ethekwini Maritime Cluster, Durban Chamber of Commerce, Island View/Maydon Wharf Leaseholder Association, Road Haulage Association, SAMSA, SAASOA, SAAFF, SA Shipper’s Council, TIPS, TIKZN, TETA; Cruise India Ocean Association, PMAESA, SATSA, ASATA; RETOSA, SATOUR, COSATU, SATAWU, NASASA: National Association of Stevedoring Associations of South Africa, MERSETA, , Seafarer’s Employment Organisation; Transport and Logistics Employers’ Association (TLEA), Warehousing and Distribution Employer’s Association (WDEA).

## 2.8: Human Factors/Maritime Psychology/Skills etc.

Few global institutions specialise in human maritime psychology or how human factors influence the maritime sector despite how human errors have contributed from incidents from before the Gustav Vasa’s maiden voyage sinking to the Waratah, Titanic and Costa Concordia. Maritime ergonomics has only recently been a priority for the Australia Maritime College, Chalmers Technical University Sweden and Loughborough University along with greater numbers of shipping companies/professional associations and researchers. The role of human error is considered increasingly expensive in an increasingly globalised world, with higher volumes of seabourne trade, risks, increased vessel sizes, technology, diverse stakeholder requirements –and fewer physical, actual people on-board vessels, administering shore operations and ensuring physical customs security. As Africa prepares for its own crew, vessels, companies and increased maritime economic opportunities; this report proposes specialised training courses and research specifically extend traditional, maritime human factors research to a specific African context.

Therefore Africa needs to adapt existing maritime human factors research/training to ensure the reality of Operation Phakisa and other African marine economy initiatives. It needs to consider how human psychology in a maritime environment affects maritime safety, security, business activities, law enforcement, health, welfare, vessel design and overall risk management. Current research has prioritised seafarer comfort/fatigue avoidance, performance and enhancement of situational awareness given increasing automation globally has resulted in fewer crew members. It would research automation. It has focused on workplace design, improving bridge design and navigation –i.e. SOLAS Chapter Vthe American Bureau of Shipping’s Guidance Notes on Ergonomic Design and The International Association of Classification Societies, Unified Interpretation on Bridge Design, Equipment Arrangements and Procedures. Other research has focused on passenger vessels/passengers; crew fatigue/endurance and crew habitability using SOLAS and International Labour Organisation Accommodation of Crews Convention. This research would also target engine rooms and all other central vessel areas –across vessel types. Although developing an enhanced indigenous mercantile, cruise, patrol, scientific research and exploration fleet may involve actually increasing crew members; given Africa’s historic maritime inexperience; specific familiarisation and training is particularly necessary to ensure seafarers identify issues, able to survive, resist and prosper. Any vessel constructed, chartered/converted/repaired/ destroyed would consider the human element, adhering to the course included IMO Sub-Committee on Human Element, Training and Watchkeeping and International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW Convention). International professional associations such as the ILO, IMO, Nautical Institute and Royal Institute of Naval Architects could further enhance academic professionalism in cooperating –consider if results differ across and within Africa/Southern Hemisphere.

To prepare it would consider seafarer experiences under all conditions, Atlantic, Indian and Antarctic Ocean climate types, risks and uncertainty, using simulators, evacuations and actual physical exercises. Research could consider improving naval, pilotage, tugs, SA Agulhas training, onshore mission experiences and search/rescue. It would consider skills enhancement/reduction, impressions and experiences. It would improve vessel traffic management. This evaluates optimal port/cargo performance given multiple stakeholders, divergent requirements and projected increases in marine economic activity under port/vessel fleet expansions. It would consider how maritime business/recruitment/law enforcement and other activities where human risk is involved, could be more effective. It proposes improving human conditions for recreational/other vessel construction/utilisation. Research could seek to reduce maritime hazard incidents, improve crisis responses, address stakeholder priorities and understand human psychological reaction to the ocean. It could understand ocean interactions with humanity and the land/vice versa. It could identify human behaviour, physical, mental, emotional or other factors which contribute to or reduce error working with equivalent applications in aviation, road, space and general health/psychology/industry/services/mining.

## 2.9: International Trade, Logistics, Business and Administration (Maritime Business) #

Global commerce is well established in vocational and academic education curriculums with specific SAQA standards and numerous service providers. However; although UKZN offer a Master’s/Postgraduate diploma qualification in Analysis of Sea Freight Markets, Carriage of Goods by Sea, Customs and International Business Transactions in Shipping/Charterparties; there is no specific overarching maritime business qualification in South Africa or across Africa. Undergraduate degrees/diplomas and certificates are equally non-existent for a maritime specific context, challenging the relevance of local African’s to participate in a marine economy, given manifold contrasts to land operations. Few international maritime business qualification examples/standards exist. Therefore SAIMI/other schools could create this to specifically promote entrepreneurs, employees, employers, government, courts, professional associations, union member, public enterprises and port authorities for Operation Phakisa and African maritime economies. This qualification would focus on addressing key stakeholder requirements and specific maritime case study issues. It would incorporate maritime law, economics, business and entrepreneurship skills; grant/loan funding applications, recruitment, marketing, operations, trade, and security. It would seek pro-active risk management –ecological capital theory, encourage financial literacy, social welfare; exploiting opportunities, marketing/publicity, customer service, IT literacy, tax, mathematics and networking/contacts. It would understand markets, demand, supply, freight rates, cargo patterns, vessel types and seabourne trade characteristics, pricing and the value of mobile assets. Mastering climate change and other risks; competitors, relationships and value chain partners, memorising factors to success and failure would enable our historically inexperienced students to progress dreams to compete locally, regionally and globally.

A specialised maritime business qualification developed with professional associations including the Ethekwini Maritime Cluster, SAQA, various Chambers of Commerce and Industry, the Marine Industry Association of South Africa and others would professionalise students to scarce skills needs. Rather than relying on existing companies or working for global enterprises, Africa could possess its own marine value chain, willing participants to exploit cabotage, aquaculture, cruising, logistics and marine value adding/beneficiation/other chances. Without maritime business, our continent will be dealing with those who fail to understand maritime specific context/research areas and skills required –even maritime psychology/human, environmental and other factors; with higher probabilities of bankruptcy, collapse, accident, debt and threats of hostile foreign takeovers. Scarce funding will also be wasted. Stakeholders need understand the implications of footloose assets, economies of scale, just in time production, customs modernisation, technology, maritime financing and chartering, international regulations, safety factors and risks. Candidates would need to understand differences in vessel types, market structures, demand, supply, price, costs, revenue, marketing and cargo characteristics, long run and short run implications, alliances, decisions to operate, construct or scrap. Factors influencing the projected future of global shipping, customer psychology and expectations are also seldom taught. These factors are generally not specific enough in existing courses, wasting candidate and education provider’s scarce resources and value to implementing a real maritime economy.

## 2.10: Marine Biology/Ecology

Whilst certain stakeholders may critique the inclusion of areas upon which South Africa has adequate institutional education, training, research and facility capacity; this reports purpose is to provide a comprehensive overview of all maritime education related areas that could be potentially enhanced in relevance to an African maritime economy and education future. Marine ecology/biology would further benefit if interlinked with other subjects under the constitutional enshrined, centralised representative institution, maritime education legislation, professional connections/funding sources and ideas summarised in this report and through concentrating on specific emergent research issues. South Africa’s existing academic qualification granting marine biology/ecology institutions include NMMU’s Departments of Zoology/Botany and Coastal and Marine Research Unit; Rhodes University’s Departments of Botany, Zoology and Entomology with Ichthyology and Fisheries Science. Others include the South African Institute of Aquatic Biodiversity. Stellenbosch University’s Departments of Botany and Zoology and Marine Research, UCT’s Department of Biological Sciences, Marine Biology Research Institute and Marine Research Institute and the University of Western Cape’s Department of Botany/International Ocean Institute (South Africa) offer equivalent courses. UKZN’s School of Life Science also specialises in marine biology. The KwaZulu-Natal Sharks Board along with the South African Association for Marine Biological Research incorporates the Oceanographic Research Institute and community/ high school education awareness programmes, as do Cape Town’s Two Oceans Aquarium and Port Elizabeth’s Bayworld

To enhance African maritime economic opportunities and successes; this report proposes focusing on pioneering areas highlighted elsewhere in this report, especially for aquaculture and fisheries proposals. This could focus on improving species health, medicines, product quality, habitat, product shelf/storage extension life; marketing, export and business opportunities. Priority could focus on foreign species including trout, catfish and salmon to test impacts on local species plant and fauna –mutual interactions and ecosystem consequences including water quality/security. This is especially essential to avert existing foreign species prejudice that threatened previous recreational/commercial fisheries. Additional research could focus on human nutritional, health and food security requirements and the extent to wish seaweed/seafood and related resources can improve local health, community development and economic potential simultaneously. Existing research could work to improve existing marine ecological awareness and appreciation across communities, businesses and elsewhere. It could conduct a biodiversity asset register; work on extending coastal/marine reserves, resource security, observation and exploration. Priority could concentrate on species closest to extinction/endangered and working to secure gene banks/species reserves. Further work could concentrate on human/economy/other impacts on marine ecosystems and vice versa –especially on improving ecological risk management/lowering externality costs. Impacts of poaching/species loss could also be monitored. Marine tourism including aquariums/cruising, recreation and conservation guides could be trained to understand marine ecosystems more cautiously.

Currently Africa lacks joint fisheries/aquaculture/ecological education, research, resource monitoring and law enforcement partnerships of the Pacific for institutions to connect further. Commercial opportunities in improving training, medicine, fish feed, equipment, technology and marine ecological products also exist. Any future programmes, research, training, facilities and projects would further gain from developing equivalent SAQA/internationally recognised and accredited qualifications and enhancing partnerships with the NRF’s SANCOR network, the DAFF’s Fisheries Branch and the DEA’s Ocean and Coasts branch, ASCLME, OdinAfrica and SAEON/SCOR networks. As with other areas, existing capacity remains with uncoordinated stakeholders, institutions, non-centralised data/research, centralised partnerships, standardised qualifications/student/researcher and faculty recruitment centres and professional connections. The majority of marine ecology research is biological whilst future research could favour emotional/psychological and mental capacity. It could concentrate on what can we learn from other species –how can they assist us and improving chances of inter-species marine contact. More work could focus on developing ecological economic values, ascertaining the specific values and functions/benefits of each individual species. Scholarship could also augment resilience/reduce species and marine resource supply chains against climate change and other projected disruption risks. This could concentrate on maximising stakeholder risk awareness, minimising recovery time and marine ecology threats. Further work could concentrate on projecting existing species, ecosystem and ocean/coastal health to enhance multigenerational sustainability, beyond local territorial waters across Africa, improving regional capacity and partnerships.

## 2.11: Marine Contact#

Since human inception we have blinded ourselves to some of the greatest allies, troves of knowledge, experiences, connections and relationships this planet has harboured. To our increasing cost and overwhelming planet suffering, we have been self-species orientated –with few exceptions! This report’s author proposes another trail-blazing course in which pursuing a marine education and knowledge economy through specialised research/academic facilities can serve: Marine Contact! This would not only serve Operation Phakisa but represent a further way in which Africa could lead the future of Earth maritime scholarship. This is yet to be formally established anywhere. Marine contact –would simply focus on inter-species contact, communication and understanding, to mutual human and non-human benefit. It would seek to learn from, utilise, value, preserve, assist and defend other species rather than just subjugating or exploiting them just as present. Given our experience with wildlife, domestic species, conservation and medicine/psychology; this research believes that South/Africa has potential if it is favoured. Whether San trackers or rangers based on Dr Ian Player or others; this research could consider everything from observation to linguistics to behaviour, emotions, mind, environmental protection and physiology. First marine contact would be made; then lexicons and communications established. Then relationships would be forged –consider how we can improve their health/welfare/survival/quality and gain trust –given past experience. Then training without resorting to physical or other pain conditioning as present before a stage of encouraging greater human-other species alliances; understanding, appreciation and use. Land/shore/aerial related ecosystem contact could be forged simultaneously

Project Arion would specifically target marine ecosystem species. Mutual benefits could assist Operation Phakisa and species wellbeing in a greater model of ecological harmony and symbiosis than currently human’s extractive relationship. For example, as Africans we are confronted with the same resource, time, number, financial, technological and other challenges and constraints as other human beings globally. However, in return for protecting other species more stringently from threats; extending sanctuaries, reducing threats to marine ecosystem, ocean and resource survival, health and prosperity –addressing their concern and granting greater rights/respect/value and appreciation; they could assist in so many ways once even basic forms of communication are understood. For example, to assist Operation Phakisa, they could preserve African maritime sovereignty and security. Tracing other species would be able to more swiftly/effectively deploy limited resources to observe threats whether emerging climate/natural disaster hazards; piracy, poaching, overfishing, war, migrants or other maritime security threats. In exchange we aid them by prohibiting bycatch, industrial trawlers and other threats that collapse entire species. Other species could aid in monitoring resource security/management. They are more effective barometers to calibrate their own/ecosystem’s resilience/use/value –to conserve reserves. They could aid submarines/other vessels in oceanographic surveys, cartography and exploration. They could improve search and rescue –identify incidents, determine hazards and improve navigation for local African vessels/seafarers developed under marine tourism, education and cabotage initiatives.

Studying but learning from extremophiles would improve our own adaptability to harsher environments. Other species could monitor foreign vessels –especially cruise vessels and fuel carriers for marine environment infractions, test water quality, ensure dredging/mining and general coastal development does not adversely affect species health/reproduction and quality. It could improve the monitoring of wild fisheries for sustainability –commercial and environmental with far more accurate data. This would help prevail against climate change and ensure the success of this author’s thesis proposed, Ecological Capital Theory of Risk Management. Aquaculture could improve in quality-avoid species loss in considering the most optimal conditions/experiences from other beings directly affected. Improving species rights, welfare and values would further aid humanity’s appreciation/eco-literacy –could consider peace and mediation. Working with species might improve marine tourism –Provided other species received peace and were preserved –i.e. Sardine Run. They might be more willing to be observed/photographed. Without other species; Africa would be even more challenged to compete globally –uncertain maritime resource security and economic activity, more arduous to charter and weather squalls/perils. Therefore, developing this maritime education project would seek to recruit anyone who could benefit from other species contact; whom could/would aid other species –and those simply curious to improve inter-species relations and mutual values

## 2.12: Maritime Archaeology#

Currently the entire Southern Hemisphere abounds with prospects in another globally under-renowned area of scholarship and education –concern over humanity’s maritime past and its remaining legacy. This report considers the absence of any devoted maritime archaeology research, education and training to be another glaring oversight with South Africa could specialise in, ranking internationally and being globally competitive, given the absence of rivals among IAMU members. Therefore, SAIMI or an equivalent maritime university/research centre could concentrate on the following priorities:

I: *Identify Cultural Heritage on a specific Marine Asset Heritage Register–Vessel wrecks, former infrastructure and offshore structure remains, spilled human debris/detritus of potential cultural value within local/African territorial and adjacent to EEZ waters.*

*II: Incorporate into a proposed new Marine Heritage, Salvage and Conservation Act/expand Admiralty Jurisdiction and Regulation Act/SAMSA/ SAIMI/Marine Education Bill equivalents to possess legal capacity to undertake all stages.*

*III: Charter entire area to establish current and future projected climate, environment, human, safety, security, economic and any other risks. This aims to prevent further loss consequences if existent.*

*IV: Record History and trace to originals where possible/consider community experiences –note all site characteristics, possible causes of incidents/subsequent developments as pre-emptive –avoid future incidents.*

*V: Conduct a cost-benefit analysis to consider if it is worth conserving, removing or restoring.*

*VI: Monitor marine ecosystem species if present –consider species interaction with the wreckage and implications –especially noting for aquaculture and fisheries.*

*VII: Salvage any potential removable artefacts/remains worth preserving that do not further contribute to existing/future risks –for museums.*

*VIII: Promote education awareness and marine archaeology conservation training, as evidence of maritime history, to further value the past locally, regionally and internationally.*

*IX: Consider establishing/exploiting marine tourism potential –encouraging recreational diving, cruise excursions and future submarine economic potential for distinguishing sites for Operation Phakisa.*

*X: Consider salvage/implications of maritime archaeology/heritage/conservation for domestic and international law –i.e. questions of jurisdiction/enforcement and ownership –including beyond sovereign boundaries.*

## 2.13: Maritime Art, # Cuisine#, Culture#, Vocational Craft#

Visualising a maritime education future is not merely academic or vocational. Although not specifically developed as a school or theme; maritime culture –through art, architecture, sculpture, vocational craft design, music, drama and literature is envisioned as a future for Africans committing to a maritime destiny. Although Africa has traditionally focused on its interior/land to inspire its culture, as more of us become familiar with our maritime history, the ocean’s archaeological legacy and the possibilities of moving towards the coast/seas; this report proposes capitalising on maritime culture courses/related training. Masterpieces in painting, sculpture and decorative arts commemorating the projects undertaken, the vessels commissioned, exploration discoveries chartered, species encountered and pivotal moments/ coastal and oceanic seascapes of daring, grandeur and poignancy would further consolidate Africa’s commitment through tangible cultural assets. Expanding inland and coastal aquaculture sustainably could concoct its own seafood/seaplant cuisine. Poetry, music, plays and literature epics could be composed and performed in inspiration. Promoting maritime culture through education, in art, fashion, photography, architecture and elsewhere could physically promote public awareness and appreciation further in courses and opportunities. This could further improve exports and our cultural legacy abroad, reflecting on our local and continent past from Egypt to our African future of vast proposed port expansions, maritime fleets and specialised maritime education. Whilst a centralised maritime centre could provide guidance/qualifications, this could extend the maritime sector to existing art galleries and institutions.

## 2.14: Maritime Communications#

Currently South Africa and Africa have highly limited institutional capacity for any specifically maritime communication-based training and research. Grindrod Training Academy and Maritime Training South Africa only offer 5 day courses in Global Maritime Distress and Safety Systems Long Range and Short Range Communication Certificates focusing on radio communications. VHF Training also offer a related course. However, these ignore other forms of communication. This report proposes this as an emergent research area concentrating on the need for those involved in the marine economy/involved with the oceans to be connected with underwater, land, air and space-based counterparts. It envisions connecting all supply chain stakeholders with hinterland connections –from producers/fisherfolk to ports and shipping to businesses, governments, communities, navies, research vessels and coastguards to recreational use to consumers. The proposed courses would incorporate SOS, Morse code and other IMO Standard Marine Code Phrases. South Africa’s maritime education centres could offer specialised courses relating to maritime satellite/Internet/ underwater cable communication. These could offer IMO courses based on standard Maritime Tests of English Language, once formally approved by SAQA to update its future maritime communications. These courses would concentrate on promoting maritime communications across Africa, covering AIS transponders, ECDS, navigation, customs, vessel traffic, cargo and risk management systems, Voyage Data Recorders, radar, sonar, emergency codes, and Long Range Identification Data Exchange Systems for vessels, ignored by existing courses.

This report therefore considers South Africa via SAIMI/TETA and others could focus on specific research and training to assist Operation Phakisa requirements for internationally competitive and qualified seafarers under cabotage; cruise tourism operators, engineers, artisans, fabricators and workers. These must be capable of operating, repairing, fabricators, removing and securing all forms of global maritime communication from radio to satellites to underwater cables. As maritime supply chain and economy stakeholders develop, increasing the quality, volume, security, safety and cost-effectiveness of maritime communications in technology, research and training will become essential across Africa. This could further aid local capacity –especially if linked to developing satellites/telecommunications under an African space economy. It might focus on cultivating the safety and security of Navy, Coastguard, SAMSA, anti-poaching patrols and other local vessels. It could improve maritime Internet access including for remote weather outposts, foreign and local vessels i.e. the SA Agulhas and SANAE IV base. It could improve and operate vessel traffic management systems to reduce congestion among Africa’s ports, determining the most optimal logistics arrangements. Africa could develop its own Marine Electronic Highway with AIS, automated weather, marine environment and DGPS stations, following Singapore –but with local recruits. It could improve links to intermodal transport to avoid adverse delays to aerial, road and rail traffic. It could improve navigation and stakeholder reactions/coordination against any projected risk scenario i.e. the presence of a cyclone, tsunami, storm or flood.

## 2.15: Maritime Economics/Port Economics

Maritime/Port Economics can be defined as integrated economic/financial/business factors that concentrate on marine resource allocation, port management, logistics, shipping, seaport and maritime supply chain management from an economics perspective considering, scarcity, opportunity/other costs, revenue, competition, market pricing, demand, supply, revenue, equity and efficiency. Similar in content to maritime business/logistics, this course exists only under generic qualifications in Maritime Studies –at Master of Commerce level under UKZN and Diploma/Degree level at the Durban University of Technology with very, very few professionally qualified maritime economists/trained business professionals. This presents few options for students to understand and contribute towards Africa’s and Operation Phakisa’s maritime future from an economics perspective. Currently South African maritime and port economics focus on port pricing, port productivity indicators, seaport management, maritime business/international trade and logistics. It concentrates on port governance models, financing, functions, economic history and performance.

To aid Operation Phakisa and Africa, however the courses would link to the above related subjects including international trade/maritime business etc but would concentrate on developing sustainable, cost effective economic opportunities, as equitable, competitive, allocatively and productively efficient as possible internationally. This would concentrate on stakeholders improving understanding of its maritime economic potential from the above issues, with localised textbooks and case studies, enhancing the success of maritime businesses beyond individuals to consider a holistic supply and value chain perspective. This could start with localised cabotage, cruise ships, value adding/manufacturing and aquaculture, all of which profit from applying maritime economics principles. It would distillate the roles that maritime/port economics can serve in facilitating maritime education, regional, local and international economic development and community welfare given scarce, finite resources especially through maritime clusters not just Ethekwini but coordinating stakeholders in networks across all sea and dry ports. However, this would target stakeholder requirements.

Maritime economics for future research could focus on ascribing values of marine ecosystems and resources as a pre-emptive form of ecological capital theory risk management for supply chains as detailed for the Pacific in this author’s currently undertaken, PHD thesis. It could progress economic models to assess the costs/opportunity costs of various risks under specific uncertain maritime futures and policies, enabling more constructive decision making. Research could assess the viability in financing undertaken port expansions/other maritime finance related issues. Ultimately, for each Table I listed curriculum subject, African maritime economics could contribute globally in determining constructs/models for each. Each possesses costs, benefit, economic and other policy implications, with few international formal economic model answers as guidelines. The economic costs, revenues, productivity, performance and functions for each can be calculated and analysed –considering how certain factors can be magnified/contracted. Refining maritime economics can determine which areas should be prioritised, when, how and why given limited resources/opportunity costs, risks of maladaptation/competition/performance etc. Research could also assess potential foreign economic threats –i.e. the rise of China’s Silk Road and maritime trade policy implications.

## 2.16: Port Pricing#

Currently, the Port Regulatory Authority of South Africa and Transnet are responsible for jointly determining South African port pricing tariffs, methods and guidelines in alignment with stakeholder consultation and guidelines. However, no formal institutional capacity exists either within South Africa or regionally in Africa. But under personal experience, UKZN considered it as a Port Economics research assignment. Establishing certificate qualifications in port pricing represents a new opportunity for SAIMI/a proposed maritime university or any subsidiary maritime education provider. A projected course outline could focus on the following areas considered by this author in a previous assignment: Improving South Africa’s Port Pricing Mechanism Tariff Methodology and Structure. A projected outline would focus on domestic, regional and international port, cargo and other supply chain pricing tariffs, methodologies, structures, legal policies, incentives –including environmental/frequent user, penalties, dispute resolution; history with current and future policies, different structure/methodology types and international comparisons. This would assist not just academics, port officials and regulators concerned with research, revenue and law enforcement but those involved in marine business/administration/law/ port economics and customs to maximise port user benefits/welfare. Existing research could consider the most optimal areas for encouraging/discouraging certain port and supply chain stakeholders, maximising revenue, welfare, efficiency and productivity. This is particularly significance in cost recovery with applications to seaports, dry ports, land borders and airports –especially given Africa’s concerns with giant port expansions –for Operation Phakisa and the Africa maritime economy. No professional association exists but certain stakeholders including the IAPH/AAPH/European Seaports Organisation from a practical perspective and the IAME from a theoretical perspective might be interested as a forthcoming research area.

## 2.17: Maritime Education#

Whilst maritime education opportunities are being promulgated across South Africa as part of Operation Phakisa, no existing facility and few stakeholders have considered the need for specialised maritime/general education professionals, research and qualifications that enable these to happen. Across Africa; students, researchers, faculty, administrators, businesses and other vocations are enrolling students abroad at great expense, rather than improving existing institutional capacity for maritime/general education. Few specific courses exist –and generally focus on vocational skills/seafaring without considering maritime education implications for all areas outlined in this chapter’s proposed curriculum and others. These courses focus only on practical outcomes rather than theory, developing students, general life skills or employment in the real world. However, even specialised maritime universities have generally failed to evaluate, develop and prioritise maritime education for their own countries, let alone consider the needs of the African continent and our maritime futures. Therefore, this report proposes a curriculum/courses are specifically developed to train maritime researchers, secondary, vocational and tertiary sector teachers/faculty; businesses and other key marine economy stakeholders as soon as possible. It proposes concentrating on improving the quality of SAQA and other examiners to understand/establish marine qualifications.

Related courses in maritime education would mirror conventional education but from a maritime context, empowering students, teachers and others to satisfy stakeholder requirements and the needs of Operation Phakisa with skills, theory, knowledge, experience and examples imperative for success. These courses would emphasise Africa’s maritime past, present and future. Yet we must consider global maritime risks, to ensure generations of resilient, confident, capable individuals, able to contribute and prevail against uncertain risks including climate change and international competition. This aims for a more secure, safe and certain future. It would inspire traditionally land orientated Africans and international students/partnerships and alliances to value and consider the ocean’s aureal future survival amid mutual prosperity. Other aspects course participants could master encouraging vocational guidance, technical proficiency, publishing, fund raising, community services and psychology. Courses would concentrate on developing critical thinking, debating and research skills on core maritime related issues, looking at possible solutions, new ideas, novel technology and entrepreneurial proposals constructively, seeing how Operation Phakisa can further be enshrined as a reality across forthcoming generations.

Global maritime education fails to equip participants for an ever evolving, maritime economic future and destiny. Africa differs from other areas as our inhabitants have yet to be as familiar with our ocean’s presence, influence and value. Maritime education would further flourish by centring on student and faculty aptitudes, maritime interests and encouraging supervisory-academic and other professional relationships, where current academia fails in being publication/ranking/reputation orientated. Research could prioritise amending/drafting related policies, legislation, local textbooks and case studies. Businesses could work with maritime education to overcome scarce skills and constraints to existing employment. Further options exist across Africa to implement its Integrated Maritime Strategy.

## 2.18: Maritime Engineering

Maritime Engineering can be divided into 2 areas; those relating to training professional engineering officers for vessels under vocational courses and those involved in maritime structures/vessel design, operation, repair, conversion, construction, demolition and improvement. Throughout Africa only Jomo Kenyatta University of Agriculture and Technology in Kenya offer a formal degree and Cape Peninsula University of Technology offer a SAQA accredited diploma relating to non-vocational qualification courses. This report recognises the high need to prioritise this skill, given the only professional body, the South African Institute of Marine Engineers and Naval Architects (SAIMENA) with 435 members, has only 11 formally registered marine engineers to address Operation Phakisa. If South Africa is to develop its own maritime fleets, promoting ship repairs, port expansions, oil rig exploration and other projects, it requires professional marine/maritime engineers to complement ocean engineers/naval architects and others. Australia even has a specialised Marine Engineering Qualification Bill requiring marine engineering/electro-technological accredited qualifications for all professional officers and engineers for vessels exceeding 500 GRT/3000 kWh. Engineers require sea service training, maintenance training, education and experience. Other sections detail how it will need specialised businesses/maritime engineering laboratories and facilities to conduct research/enhance performance of existing vessels/structures.

This research proposes partnerships are developed with SAIMENA, SAIMI, local engineering facilities/professional associations, IMMEREST and international institutions to develop marine specific capabilities –establishing import substitution of marine engineering products/skills capacity. It could update future skills through continuous professional development, becoming as mandatory as medicine/law/accountancy to ensure relevance repeatedly. For example past courses have covered pumps. IMMAREST offer further conferences in which African maritime engineering students and researchers could globally present and learn from including International Naval Engineering Conference and Exhibition, Ballast Water Technology, Marine Electrical and Control Systems Safety plus the Engine as a Weapon.

Current training courses could be improved. CPUT’s Engineering Officer courses cover communications, IT, basic law, mathematics, marine science, marine engineering, electrotechnology, naval architecture, fluid mechanics, machine mechanics, engineering drawing and shipbuilding technology as year 1 courses. Year 2 is vocational. Year 3 includes internal combustion, refrigeration and steam plants/heat/maintenance. However the University of Tasmania/AMC manage to sustain undergraduate, Master’s and PHD levels plus vocational officer training and specialised research facilities. Courses range from 3-9 years on average. Their courses further develop electrical power, propulsion, navigation, maintenance, mechanical and operational systems/technology. Other subjects cover thermal engineering, reliability engineering, hydrostatics, mechanics of solids, project engineering, offshore structural design, applied control engineering, dynamics, ship design, resistance and propulsion and offer specialised research project options. One option specialises in Technology Management emphasising naval architecture, marine propulsion systems, ship design, research/human resource/financial and project management, strategic/port management, logistics, maritime economics and service management. Personal safety, survival, emergency response, first aid and firefighting, teamwork, could aid professional vessel engineer officers. Other areas could include machine maintenance, fitting, operation and repair, cargo operations, applied mechanics, advanced maritime control and automation. The Naval Engineering course not offered in Africa, investigates Marine systems modelling, simulation and design, advanced data analysis/maritime engineering analysis, signal conditioning/data acquisition. It adds postgraduate writing skills plus computational fluid dynamics with hydrostatics. Optional courses include shipyard production processes, fisheries management, marine safety/biosecurity, marine environment and society, marine superintendency, surveying and inspection. The University of New South Wales offer systems/requirements engineering and measures to devise field tests/experiments.

Africa can further out-compete global maritime engineering facilities through specialised simulators and vessels, offering funding to set up additional businesses, attract students, lecturers and researchers. Instruction also will have to emphasise the need to develop swift problem solving, flexibility, resilience, resolve, critical thinking, risk/general management and other skills. Jomo Kenyatta University of Agriculture and Technology emphasise drawing, algebra, calculus, geometry, technical drawing, machine elements, organic chemistry, physics, ship technology, computer programming, electric circuit board analysis, electronics, signal communication and thermodynamics. It covers marine structural design, soil mechanics, vibrations, stress analysis and pneumatic/electro-hydraulics. An African maritime economy could establish more marine engineering firms following Kenya’s AMGECO to projected increases in seabourne trade and locally registered vessels. These could provide employment prospects in dry/construction and wet dock operations, repairs, bunkering, chandling, port equipment/systems, navigation/communication aids, equipment manufacture, afloat/inland repairs and structural repairs.

Future research could follow other global and local challenges including improving fuel performance, creating more environmentally sustainable/friendly vessels, pipelines, ports, terminals, oil rigs and structures amidst projected climate change. Perpetual offerings extend to enhancing efficiency, reducing maintenance costs; considering waves, hydrodynamics, defence, component design and other areas. It could distinguish between recreational, fishing, general/other cargo, pipelines, cruise, naval, patrol and other purposes more effectively. It could concentrate on improving ocean surveying techniques, security, safety, environmental protection, and other area needs. Further research could investigate automation/extent of redundancy; implications of ocean climate/environment and other hazards, human factors in relation to marine engineering, power and other system optimisations, renewable energy and vibrations. It could focus on hybrid systems, propeller and propulsor design –especially for all 3 ocean environments and pipeline/cable sedimentation issues. It proposes more inter-engineering/architecture/ technology and other area research collaborations –i.e. electrical, water, civil, electronic, security and mechanical engineering to devise solutions, given African scarcity of dedicated maritime engineers.

## 2.19: Maritime Finance

Africa appears determined to invest in its maritime economic future however, very few have considered how this will materialise, who is likely to finance it, how is it to be financed and why. Maritime finance is not even mentioned on any academic institution’s current or forthcoming syllabus, with no students, researchers, faculty or trained professionals able to specialise in specifically maritime rather than general finance, banking, insurance, investment, accountancy, tax law and other related subjects. This report counsels rapidly devising this capacity locally, if we are not to be beholden to non-Africans. Kenya have proposed this as a possible development in Mombasa. Given few global institutes specifically concentrate on maritime finance, developing localised capacity provides a further exportable expertise once cultivated. Currently maritime finance is globally centred on shipping. To devise world reputable qualifications, South Africa’s institutions can improvise from existing facility course outlines. World Maritime University provide a Master’s in Ship Finance and Investment concentrating on ship loans, investment, insurance, chartering, finance, tax law, accounting, financial management, risks, capital sources, cashflow, revenue, costs and benefits, stock markets, equity, junk bonds and bank credit analysis. ICMA UK in Reading offer similar MSc degrees in International Shipping and Finance. These cover chartering, maritime business/economics/trade and logistics principles –similar to other chapter summarised curriculum areas. Lloyd’s Maritime Academy only offer certificates/Postgraduate Diplomas in Maritime Insurance.

For Operation Phakisa, this overview proposes maritime finance is not just ship orientated but helps locals to implement flourishing cabotage/chartering/local cruise vessel priorities. It proposes maritime finance focus on other marine structures and projects including aquaculture, maritime education/training, research, value chain businesses, port expansions, maritime clusters (Ethekwini) and offshore/underwater exploration. It proposes eventually South Africa/Africa could establish its own regional maritime stock exchange, maritime finance banks, parastatal and private shipping corporations plus trained professionals/businesses. A specialised maritime finance bank and course would offer maritime mortgages, construction, chartering, conversion, training, repairs, equipment and other loans/incentives; financial advice; consider seafarer and other value chain remittances/savings and investments; finance marine economy activities, It proposes forming partnerships to gain and provide experience to Lloyd’s and the Baltic Exchange, Spinnaker Global, the UK Institute of Chartered Shipbrokers, the Chartered Institute of Securities and Investment (CISI) and others. It also proposes specialised maritime finance consultancies patterned on Drewery Research Services. This conducts market research and forecasting, evaluates/acquire vessels, promotes investments, maritime financial modelling under divergent scenarios/events. To reduce risk, this report recommends Cambridge Academy of Transport, which considers principles of ship financing amidst potential market uncertainty. It would evaluate divergent equity sources from debt financing, loans, bonds, tax and Islamic finance. Emphasis would work on fund raising not just for research scholarships but for financing pilot projects, new businesses, investments, ideas and technology whilst operating and financing existing ones. Future research/priorities would include updating existing and proposed maritime finance related legislation and convincing the traditional financial/banking/insurance sector against specific maritime risks. Courses, research and the above businesses could focus on familiarising stakeholders with specific maritime characteristics and updating the Ship Register, considering tax, the 1993 International Convention on Maritime Liens and Mortgages, customs and trade duty implications for maritime finance.

## 2.20: Maritime Geography

Similar to courses/areas in oceanography and surveying, this area could more specifically concentrate on seeking to understand the role/significance of maritime geography upon other curriculum related areas. No current institutional capacity in Africa exists and few global maritime education centres provide distinct qualifications. Given how little is known about the world’s oceans and Africa’s territorial waters/marine and coastal environment; these courses and research areas would emphasise the need to charter and categorise as much of Africa’s marine territory and surrounding oceans as possible. This could aid Operation Phakisa through considering the role of maritime geography in locating maritime infrastructure –including offshore gas, proposed port expansions and aquaculture. It could consider maritime geography influences on supply chain/maritime logistics and manufacturing; in resource location and effective utilisation/conservation; in proactive risk management against threats; navigation, optimal cargo management and cruise/cabotage vessel route and operation design. For example it could save fuel/maintenance/insurance costs for local vessels. It could enhance efficiency and productivity. Maritime geography could improve naval warfare/strategy; response rates during emergencies/maritime safety and security. It would focus on human factors –not just how we influence this area but how maritime geography affects us.

## 2.21: Maritime Health

Maritime Health is another subject for which Africa remains underprepared and seldom concentrated as a separate global point of academic significance. With over a billion people and significant ocean territory as more Africans from Nigeria and Liberia to the Cape to Kenya to Egypt/Somalia venture into the oceans, implementing maritime health as a part of an integrated curriculum is indispensable to success. Currently, South Africa only dedicates training to specialised first aid for seafarers as vocational courses at the Cape Town Academy of Maritime Medicine. It has trained traumacologists and other specialists with a training manual: Medical Emergency at Sea. This customises first aid to seafarer/captain based and firefighting. However, this report reflects specialised maritime hospitals, research laboratories, physicians and health/medicine schools could be established to understand, enhance and ensure the health and welfare of emerging African seafarers, navy/coastguard/maritime law enforcement, cruise/marine tourism; offshore exploration, oil rigs, surveying and other marine economy stakeholders. For Operation Phakisa to emerge, research and maritime training need to understand the implications not just of human factors on the marine environment/maritime psychology elsewhere but physical health implications of exposure to the maritime sector. Research would prioritise both human and non-human/marine ecosystem health –including vetinary for aquariums/marine reserves/aquaculture and marine contact pilot programs. With ethical safeguards, research could consider marine environment plant, species/human medical technology and applications beyond benevolent health properties of a seafood diet, iodine and seaweed.

The US have a specialised Maritime Health Centre although primarily concentrated on occupational health/safety, disease control and first aid. It initiated a fishery safety programme monitoring vessels, accidents, fatalities and risks, creating personal flotation devices and improving stakeholder situational and information awareness. This is being expanded to consider stationary guarding for winches, insurance and health data. Its research has considered heat/cold stress, diving/underwater exposure pressure, confined spaces, welding, noise exposure, trauma and work shift management. In addition to IMO/SAMSA/TETA/SAQA accreditation, further partnerships and connections could be forged with the Spanish Society of Maritime Medicine, World Health Organisation, International Labour Organisation and the International Maritime Health Association. The TK Foundation are improving standards for doctors committed to seafarer health. Africa could further learn from the Norwegian Centre of Maritime Medicine which empowers standard registered qualifications as mandatory –regulating seafarer health standards. Courses would have to prescribe at a minimum to the International Conventions on Standards of Training, Certification and Watchkeeping for Seafarers plus Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel (STCW-F).

The future of African maritime health research, training and education could venture far beyond mere first aid to consider the most common medical risks, causes of death, fatigue, injury, disease, maritime environment food poisons/disease implications, epidemics and others –in a maritime specific context working in partnership with conventional medical researchers and practitioners. It could consider sensory perception –magnified/reduced under maritime conditions. It could consider climate change on the maritime sector –and health implications to minimise risk. It could improve port health/biosecurity, customs and quarantine control. It could work to promote maritime health awareness –especially considering seafarer venereal, metabolic, alcohol and other disease transmission implications both among African citizens and foreign crew/tourists/workers. It could especially consider implications of increased risk, automation, vast distances and challenges of the Cape route, the Atlantic, Indian and Antarctic Oceans. Onboard vessel facilities could be improved while mobile coastal medical units/vessels could be deployed to promote health especially among Africa’s archipelagos from Cape Verde to Zanzibar, Pemba, Madagascar and the Seychelles. Diplomas could target sports and recreation. Tele medicine over vast distances especially for Antarctica/ emergency rescue could be improved with SAMSA, shipping lines, Transnet, the Navy and other key stakeholders including SANAE IV base, Prince Edward and Marion/Gough Islands. Specialised medical textbooks, case studies and journal research could emerge from Africa if pursued especially in International Maritime Health Association cited journals.

## 2.22: Maritime History

To cite the old adage *‘****Those who forget the past, are doomed to repeat it.”***

Currently Africa’s horizons extend forward without considering the conditions and past that made it emerge. Currently research, education, archaeology, museums and conservation across Africa and the Southern Hemisphere is land orientated, blind to the waters, climate and other forces which have shaped its existence. Therefore, to avoid/minimise repeating mistakes, risks and catastrophes; to promote popular awareness; this report proposes developing courses/research, funding and archive/conservation workshops/qualifications from high school level to certificate, diploma and degree both undergraduate and postgraduate. It calls for a mandate to understand and specialise in local, continent and offshore related maritime history, linked to maritime archaeology and specific areas summarised elsewhere. Research could focus on understanding maritime successes and disasters; the development of Operation Phakisa and similar initiatives and maritime perils with SAMSA/the Coastguard/Navy and others. It could focus on the history, present and future of aquaculture, cabotage, maritime trade, cruise vessels and maritime conflicts, working with existing shipping companies, port authorities and others to record and preserve as much as possible. Further scholarship could prioritise oral/written history –with separate projects for seafarers working locally and abroad, fisherfolk, the SA Navy, the Merchant Navy, SA Agulhas I/II, pilots, dredgers and tugs; cruise passengers and crew/ along with coastal communities, SAMSA/the Coastguard. who have experienced maritime historical incidents of note. African regional maritime history, its ports, offshore exploration and archaeology could be further chronicled and documented, even filmed. This would assist in public appreciation, maritime risk minimisation and cultural motivation.

## 2.23: Maritime Law and Diplomacy

Current maritime law institutional capacity across Africa is restricted to South Africa with few lecturers and includes: The University of Cape Town offer Shipping Law. UKZN provide a Postgraduate Diploma/LLM in Maritime Law with courses in Admiralty Law, charterparties, Incidents of Navigation, International Trade Law, law of the Sea and International Insurance. Maritime Diplomacy has yet to be formally established but could involve familiarising government/business stakeholders with points of maritime law, wherever country/regional/continental interests are involved as a future course. This report proposes specific maritime law programmes/text books/ law internships incorporating all key South African, African regional and global laws/polices, practises, regulations and court case examples are prioritised for development, especially to train other African countries as a comparative advantage. It proposes establishing local case studies/field trips and debates to courts/potential areas of maritime risk/sensitivity.

**Admiralty Law**

Currently, South African Admiralty Law focuses on the 1983 Admiralty Jurisdiction Regulatory Act, considering legal applications, enforcement and practical case study examples. It defines a lien/claim, establishes the nature of a vessel arrest, dispute resolution, priority of distribution, relationship for parties and maritime related defence/prosecution over issues, the vessel sale, fund and distribution of proceedings. Yet it ignores examples of international and foreign law plus the application/implications of other equivalent maritime legislation that could influence maritime sovereignty. The extent of existing maritime law related authorities such as SAMSA and MLASA has not been identified/valued. As the sole provider for the African continent, phenomenal market opportunities exist as African governments in which SAIMI, MLASA and UKZN could jointly partner to extend existing capacity. This report proposes a future curriculum/research could focus on the following emerging issues in enforcing the 2009 African Maritime Transport Charter and equivalent maritime legislation. It proposes concentrating on how African governments, individual stakeholders, customs, port authorities, terminal operators, the navy, environmental, tourism, recreational and safety authorities can be delegated certain powers to enforce national/local maritime sovereignty over the EEZ and boundaries. Research could focus on the current and future African challenges to maritime sovereignty including foreign fishing/research/ cruise/cargo vessel incursions, migrants, water security, poaching, smuggling and most of all potential climate change uncertainty. It needs to prioritise implications of maritime projects including infrastructure, vessels, marine conservation, technology along with foreseeable risks and opportunities with associated maritime law implications. It could consider the validity of African based contracts of carriage, maritime finance, insurance, customs enforcement, cabotage and maritime business ownership/issues in response to Africa’s aspirant maritime future.

It proposes the 1983 Act is modernised with appropriate stakeholder consultation to be more relevant to enforcing South African and African maritime sovereignty, ocean governance, law enforcement, protection of the marine environment, maritime safety and security against risks. The Act requires revision so Admiralty/land courts and the above delegated stakeholders possess the power to regulate, monitor, influence, change, prevent, enforce, enforce against or any other way influence emergent risks. Risks are presented by aquaculture, threats to water security including land discharge into oceans and desalinisation, cruise and recreational tourism, marine economic activities including species, underwater mining/exploration and cabotage. It would empower Navies, coastguards and other authorities to share information and assistance wherever possible. It also needs to consider the power to act for humanitarian/logistical issues, natural disasters and other hazards for those in peril within the maritime sector. African determination over the extent to which foreign parties can intervene in local maritime waters, can enter/conduct any activity above or below water or across transactions for which at least 1 party is African or occurs in African waters needs to be considered. To avert overfishing/other issues violating sovereignty from external nations it would empower an African maritime vessel with citizen’s arrest potential capacity. This incorporates the capacity to notify authorities, provided they can prove a violation is occurring/has occurred.

**Customs**

Customs training is one area in which South Africa possesses significant comparative advantages in maritime education institutional capacity, research and legal/training/information and other contributions not just locally but across the African continent and even internationally respected as a contributor towards the World Customs Organisation. SAQA have formal Customs and Freight Forwarding compliance qualifications standards including understanding the role of customs, customs tariffs, calculating customs values, international conventions and existing laws. These include understanding customs dispute resolution, declarations, documents required, processes, administration, technology, trade policy, legal liability, law, enforcement and stakeholder requirements. Aside from SARS’s Customs Academy and course offerings under UKZN’s Unit for Maritime Studies Postgraduate Diploma/Master of Commerce in Maritime Studies by the founder of the internationally accredited Global Maritime Legal Solutions (Pty) Ltd, which also exists separately, the following offer specialised diplomas/certificates/courses. SAQA accredited facilities include BPL Academy Institute for Quality, Interocean School of Shipping, Learning Exchange Pty (Ltd) Makwedeng Training, METRO MINDS P and R Development and Training (Pty) Ltd, School of Shipping and Y-2-K Customs Consultants.

Future marketing areas exist as Africa embarks upon customs modernisation processes and intermodal transport connection/infrastructure upgrades. South Africa also aims to expand Durban’s proposed second port, investing up to $25 billion in the SIP2 Gauteng-Durban Freight Logistics Corridor/new dry ports and upgraded border posts over forthcoming years. This report considers that current training courses have insufficiently prioritised international customs/logistics case studies; the history of South African/African customs and trade along with evolving stakeholder requirements. Certificates/courses could ensure stakeholders are able to debate the comparative advantages and disadvantages of the 2013 Customs Control/Duty Bills whilst able to apply them, understand stakeholder coordination/information sharing, risk management, physical security and how to register as an Authorised Economic Operator to minimise customs clearance procedures. Stakeholders could consider the most favoured legal conventions and guidelines internationally including the Arusha, Istanbul, Johannesburg, Nairobi, Revised Kyoto, SAFE and other Conventions. They could consider potential risk disruption implications and how to pre-empt/respond, linking to areas in maritime security/futures/risks. Examples include Internet/electricity interruptions, civic unrest –protests/strikes, epidemics and emergencies/humanitarian logistics. If cabotage, cruise tourism and submarines are developed, customs training including potential legal/tariff modifications could be investigated. In particular customs programmes could aid Operation Phakisa by ensuring locally registered vessels are prioritised in service, safe and secure. Customs training could aim to minimise potential aquaculture/marine ecology/tourism legal, physical, economic and biosecurity risks.

It proposes future research/training, emphasise key skills in technological advancement; consider foreign/trade policy and risks presented by climate change, neighbouring migrants, resource security; poaching; medical epidemics and money laundering/exchange controls. Research needs to consider if the Southern African Customs Union/SADCC will survive or need altering. It advises concentrating on West African/Somali piracy implications, foreign fishing fleet invasions, cybersecurity and other key African maritime safety threats as they emerge as further research/training focuses. It also suggests integrating resources with other areas especially including protecting marine/land ecosystems, health, strategic trade interests –i.e. against foreign trade dumping and foreign policy –sanctions/boycotts etc. If South Africa takes these initiatives –using expertise in security/customs etc; it could further modernise customs against external threats but also contribute towards global stability/export training in these areas. Key stakeholder professional associations that could further form partnerships to improve customs training: Road Haulage Association, SAAFF, SAASOA, SA Shipper’s Council, Seafarer’s Employment Organisation; Transport and Logistics Employers’ Association and the Warehousing and Distribution Employer’s Association. Others are Customs, Transnet, Departments of Health, Home Affairs, Environment/Tourism, DTI, DOT and the armed forces, include

**Carriage of Goods by Sea**

UKZN offers both Carriage of Goods by Sea and International Business Transactions in Shipping. The existing course of the former targets a bill of ladling and existing sea transport documents required. It details party contractual obligations, dispute resolution and legal liability throughout the supply chain process including false documents, ruined goods and other legal infractions. It distinguishes between the Hague, Hague Visby, Hamburg and Rotterdam Rules. However, the Rotterdam Rules have yet to be specifically applied to South Africa/Africa as under the authored report: ***‘How Far Do the Rotterdam Rules Advance the International Carriage of Goods for South Africa?”*** This report proposes prioritising as the first research/curriculum area along with the Montevideo and other equivalent declarations in which a proposed African centre of maritime law excellence can concentrate implementing. Maritime Business concentrates on the physical carriage of goods by sea, the validity and achieving of international business transactions and the physical establishment/process of maritime related activity. These areas can focus on similar risks, issues and opportunities including enforcing African maritime sovereignty as other listed maritime law concerns with similar implications. Risks include the implications of Antarctic, Indian and Atlantic Ocean hazards including projected melting of West/East Antarctic Ice Sheets. These include the need to upgrade legislation to incorporate IT modernisation/electronic documents/customs, cybersecurity risks and other processes. Revised laws/regulations and curriculums could consider the implications of strategic foreign relations including boycotts/sanctions on cargo contracts/vessels, enforcing trade policy on commercial contracts (i.e. tariffs, quotas etc) and extending consumer protection/liability for contracts across the international supply chain from point of origin to point of destination for South Africa, African and international authorities as these appear absent in multiple nations’ equivalent commercial maritime law.

International Business Transaction in Shipping currently concentrates on domestic and international commercial contract law, the types, definitions and validity/contractual party obligations of various documentary letters of credit, incidents of fraud, malpractice, non-payment, altered quality, risks and other commercial contract breaches including dispute resolution processes. This report suggests considering international legislation and case study examples so our stakeholders can compete internationally, legally protected wherever possible as more Africans enter a maritime economy. Examples include understanding/joining UNICITRAL, adapting and considering implementing the 1980 Vienna Convention: Contract on the International Sale of Goods and the Model Law for Electronic Commerce. These extend to the 1978 UN Convention on the Carriage of Goods by Sea, the UNICITRAL Draft Conventions on International Bills of Exchange/ Promissory Notes and on International Cheques. This report considers existing South African, African and international commercial/maritime law is adapted to specifically incorporate the other key areas where these possess the capacity or potential to influence maritime international business transactions both internationally but also locally for cabotage/coastal trade and cruise vessels.

Implementing the Model Law on Electronic Commerce -aims to facilitate international business law through validating and promoting commercial transactions; endorsing IT modernisation to electronic contracts, assuring integrity and reliability for commercial security and accuracy of international business through standardised electronic assessment criteria; reducing compliance and transmission costs; enhancing commerce and business efficiency, through automation reducing response and processing times. To enforce Operation Phakisa and other African maritime visions, it considers modifying the Admiralty Jurisdiction and Regulation Act so that whilst international courts remain possible as an option, a regional specialised African Admiralty Court of Ocean Sovereignty –over the Indian, Atlantic and Antarctic territorial waters and EEZ’s to protect African consumers, businesses, contracts, vessels, charters, governments, communities and other stakeholders. Internationally accepted contract formation to regulate the international sales of goods such as modifying the Vienna Convention; aids parties through standardising, detailing and resolving economic, legal; liability; communication and other potential risks for buyers; sellers and financiers; defining the obligations of all parties while providing for fundamental breach resolution to ensure mutual performance. To resolve potential disputes and address international contract violations aiding international business law; the proposed African Admiralty court could adapt its own version of voluntary Arbitration and Conciliation Rules.

**Charterparties**

Charterparties currently concentrates on how stakeholders can undertake a vessel charter –time, spot, voyage and demiurge/barebones. Lacking equivalent South Africa/African charter guidelines it concentrates on international legislation/policy/contract example equivalents and case studies applicable to the local/region/continent context or which involved at least one African party/cargo. Aside from establishing local guidelines; a revised curriculum/legislation needs to consider how African cabotage/cruise vessels and related maritime business/law/charters will influence Operation Phakisa/African and international maritime legislation. This could consider how risks will affect charterparties and if equivalent regulations/laws need to be abolished, altered or enhanced, improving standards of safety, security, environment and dispute resolution, preferably to African maritime courts.

**Environment, Safety**

These laws could distinguish between marine and maritime environment/safety. Marine is constrained to risks, laws, impact consequences and issues related to natural ecosystem/climate/environment whereas maritime includes the human environment –assets, stakeholders, systems, resources, economies, infrastructure, vessels, offshore structures, pipes and other factors. This report proposes 3 separate areas concentrating on the African continental/local South African Atlantic, Indian and Antarctic Ocean geographic distinctions. Whilst maritime environment law has yet to be developed for South Africa/Africa, UCT offers an Institute of Marine and Environmental Law covering the following: along with land use and Climate Change law. The International Law of the Sea covers ‘*concepts and legal principles governing international law of the sea, including (1) The law governing jurisdictional zones determination of baselines; settlement of dispute regarding jurisdictional zones; (2) marine pollution law. This includes sources of marine pollution and overview of the international legal framework; pollution from ships; dumping; pollution from seabed activities; pollution from land-based sources and atmospheric pollution. It covers marine resources law governing protection and exploitation of marine resources: protection of marine living resources; offshore oil and gas regulation; and miscellaneous resources.*

Marine environmental/safety laws, courses and research under SAIMI/other institutions could be modified to include climate change and other uncertain future risk implications; to consider protection of all marine environment ecosystems/resources both within South African/African territorial waters and adjacent wherever equivalent international/other African capacity effort fail. It may entail adjusting the Admiralty Jurisdiction and Regulation Act. The curriculum objective should aim for promoting understanding of relevant international/local laws, guidelines and frameworks including MARPOL/potential emissions reduction. However, it is more conducive to promote fundamental marine eco literacy and safe risk management so participants simultaneously minimise their externality costs to the marine/maritime environment and safety; whilst charming others to reciprocate. Research/training could investigate impacts of aquaculture, seabed/underwater exploration, biodiversity and species extinction risks, tourism, conservation, recreation, mining and fisheries activities. It could consider other risks including piracy, oil spill-overs/contamination, accidents; marine impacts on land-based economies, ecosystems and stakeholders (dredging/dumping etc) and equivalent land discharge consequences for oceans/waterways. These will subsequently reinforce and protect Operation Phakisa’s future survival through environment, resource and safety security. Maritime safety certificates/courses would consider existing hazards/incidents/court cases locally and internationally to familiarise regulators, crew and lawyers; aiming to condense risks and associated dispute costs. These include using physical visits to vessels, rigs/infrastructure/ports/aquaculture and reserves so stakeholders identify potential threats, gain effective speaking/monitoring skills and learn how to communicate it simply to communities/the public/media.

This report recommends the above courses/qualifications are developed in partnership with the equivalent Maritime Law Association of South Africa, with equivalent legal experience/processes as civic law. Once modernised, maritime law could similarly focus on improving/modernising equivalent legislation across Africa. South Africa is currently drafting a related Marine Spatial Policy Framework concentrating on marine governance. However, it is restricted to governance/law enforcement, pollution (primarily) from vessels, marine resource management and conservation areas. The various roles/responsibilities of individuals, businesses, communities, NGO’s, media and government/SAMSA/Customs/DTI etc need to be clarified. To conclude, this report proposes means of promoting African based approaches to dispute resolution, African training and perhaps a regional based African High Admiralty Court to enforce Africa’s maritime legal interests and issues. Given local capacity, either Cape Town or Durban would provide the most ideal. Emerging African maritime powers including Ghana, Nigeria, Kenya and Egypt could sponsor local maritime lawyers, justiciars and administrators. It would improve existing maritime laws, policies and regulations, prescribing to the highest standards of international legislation where local standards are not compromised or superior. There is no current compilation of existing South African/African maritime law or equivalent textbooks with local examples.

## 2.24: Maritime Law Enforcement/Coastguard//Patrols#

Laws only have validity if there are those prepared to follow them and if enforced with sufficient resources. This report proposes maritime education also needs to improve existing maritime law enforcement training to preserve safety, security and prosperity through African Navies, Coastguards, other patrol vessels, various agencies, private sector security forces, foreign partnerships, marine contact pilot projects and patriotic/incentivised volunteers. The current South African navy curriculum doesn’t emphasise the maritime law enforcement role but given its diplomatic expertise, naval warfare appears far less likely as functions. Africa will need to protect its territorial waters, its marine ecosystems, maritime resources, assets, aquaculture, port developments and stakeholders from encroachment and various hazards. South Africa’s territorial waters alone expand over 1,500,000 square kilometres. The most significant threats to maritime law enforcement to improve training/aside from general infractions include projected growth in vessel traffic under planned port expansions from Durban’s R100 billion second port, to Mombasa, Seychelles, Dar es Salaam and Nigeria’s African Maritime Economic City; oil rig development and cruise vessel traffic for marine environmental pollution. Other threats include significant increases in smuggling, land poaching; fisheries pillaging; West/East African piracy and North African/Mediterranean migration exodus swarming Europe. South Africa/Africa could also research prioritise climate change implications and other emergent risks. It could concentrate on improving drones, nano and space satellites/autonomous underwater vessels and patrols to improve coverage, connecting to the space economy.

The US Coast Guard require significant physical land and aquatic fitness. The Cape Town based South African Naval College and Coast Guard Training Institutes focus on law enforcement with skills centred courses on port/shipboard security, risk management, yachts and ROV pilots. It could improve against corrosion and other maritime risks. Any further courses would need their support/TETA, SAMSA, Department of Education and SETA. Project Biro proposes an additional 6 navy patrol vessels under Operation Phakisa. This will be insufficient under current maritime law enforcement practises/training given limited range/auxiliary and logistical support, the extent of marine economy challenges and territorial waters/assets to prioritise. 60% local procurement aids shipyards and employment. SADC and Mozambique could extend Operation Copper against piracy further. South Africa could develop specialised maritime surveillance aircraft, frigates, mission control commands, satellites, radar, sonar, magnetic anomaly detectors, infra-red sensors, other scanners, cameras and missiles –considering expertise in traditional security enforcement. It could develop interceptors, AIS, LRIT, UAV’s and drones. For example it could follow ATAC anti-piracy, cruise ship and yacht security training. Maritime Security Surveys examine existing security policy, Environmental threat and local response capabilities, building and grounds security, domestic personnel and operations; vehicle, aircraft, sea going vessels, and related personnel, vulnerability to terrorism, kidnapping, and extortion, Vulnerability to electronic eavesdropping and information gathering plus existing crisis management policy.

South Africa/Africa could form partnerships with other navies –Joint Indian/African/Cape Route/Antarctica patrols. Navies are traditionally underrated in Africa but can help beyond war defence to peacekeeping and maritime law enforcement with augmented training following the capacity of the SA navy’s elite Maritime Reaction Squadron. This report proposes existing training focus on expanding patrol vessel defensive/offensive capacity, fuel consumption, speed, emergency search and rescues response, stealth, information awareness, communication/maritime cybersecurity and hacking into other systems; stakeholder coordination and access including with SA police, DAFF, customs and more effective deployment of the Air Force. Various African nations could identify likely maritime law enforcement violation threats to prioritise scarce resources. South Africa could have a maritime environment equivalent of the Scorpions. It advances providing rewards to volunteers –share a proportion of any law offender’s fines/confiscated assets as an incentive to cooperate. It could develop inshore and offshore patrol vessels with greater capabilities and skills training/experience. To improve maritime law enforcement, connections could be formed with the presidency/DTI/ Foreign Affairs improving customs/trade policy awareness and to consider diplomacy as a potential resolution for foreign violators more effectively as a deterrent –including fines/sanctions/boycotts/withdrawn support. Research could update legislation, consider existing international/local maritime law implications for enforcement and focus on utilising other species more effectively under Marine Contact’s initiative.

## 2.25: Maritime Philosophies#

In proposing the ideal curriculum for a forthcoming epoch of African maritime education and scholarship, even the least valued and lowest priority subjects matter. Africa has a notable history of land-based philosophies from the Ancient Egyptians to Ubuntu and the African Renaissance. However, this report proposes that in transferring Operation Phakisa into actual existence will further inspire our fellow Africans to develop beyond economics and education into culture including philosophy with maritime themes. Entire philosophies could emerge from the 2050 African Integrated Maritime Strategy, Operation Phakisa and other initiatives, as more and more Africans become conscious of the presence of the ocean, its potential significance and chance to inspire. Future research could seek to identify any maritime cultures/philosophies that emerge in connection with any area covered under this report, from experience, education or insight/intuition. This could especially focus on coastal communities, ocean farers and islands from Sao Tome and Principe to the Comoros whom in particular may have developed their own considerations concerning the oceans. It could consider any philosophies that have emerged from sea power in African history including the Carthaginians, African folklore and religious beliefs, martial strategy, diplomacy, laws, policy and governance but also the maritime philosophies/culture/beliefs beyond Africa and their potential to influence our own. It could consider how other philosophies and our culture/heritage might be affected and develop. As maritime philosophy is not currently globally recognised and developed, despite the recognisable influence of our ocean sector on our past, present and future; this reflects another course example where African’s can lead and contribute to the world, given our independent development of the AIMS and Operation Phakisa initiatives.

## 2.26: Maritime Risks, Hazards and Failures#

One of the most significant constraints to establishing Operation Phakisa from dreams to reality is this continent’s and country’s reputational risk. Without significant advertising, information and training and until political, economic and social stability are secured for tourists, to counter perceptions and experiences of crime, poverty, underdevelopment, corruption and bribery, inefficient bureaucracy, stakeholders will continue to perceive Africa as too risky. It advises against a lack of hospitality to tourists and other issues, as detailed in this author’s cruise report. As with most efforts, myriad risks abound in developing an African maritime economy and future, especially for a historically land-orientated population majority. So few maritime specific risks have been deliberately identified and specifically researched/trained for in Africa. Therefore, this report proposes maritime education, training and scholarship highlight maritime risk management as a core part of existing and future courses/institutions. This selects proactive risk management –identify, evaluate, resolve and monitor risks continuously to minimise disruption, uncertainty, opportunity and maladaptation cost consequences. Whilst Uncertain Maritime Futures would consider the hypothetical, this section could choose past, existing and highly probable threats to emerge including climate change. It would consider risks presented by other maritime areas including human, natural and artificial risks, plus risks presented by safety and security to familiarise stakeholders with personal and general risk implications. Economic risks chosen for research could consider demand, supply, volatility of shipping cycles and markets, stakeholder requirements; implications of foreign competition, trade, stakeholder cooperation, trade policy, foreign investment and ultimately hostile takeovers of firms. Future risks could include the implications of migrants, maritime skills shortage, economic-social-political instability, strikes or limited education institutional capacity.

One initial research necessity would concentrate on considering which are the most significant past, present and future risks. For South Africa, the most immediate reputational, political and social risks include uncertainty over local political leadership including the 2017 ANC leadership election, 2019 South African presidential election, reliability of electricity, water security, extent of strikes/civic unrest, transport and traffic congestion plus the future of Operation Phakisa/ foreign markets with unstable prospects. Other social protests, strikes and signs of civic dissent present other reputational risks and origins for further instability; unless stakeholders are sufficiently coordinated and informed. Although considered to be low probability events, potential high impact costs indicate that significant maritime safety and security risks possibly exist for both current and additional vessels, including ‘terrorism,’ hijackings, accidents, piracy and other crimes if more vessels and stakeholders emerge, needing analysis. Other maritime security risks summarised include potential social-environmental-health risks established by medical epidemics (i.e. the Gulf of Guinea Ebola virus), and invasive species for which port health authorities and cruise lines require consistent and constant monitoring. Others include cybersecurity and data attacks, risks of oil spills, fires, icebergs, collisions with species/objects/ other vessels, explosions, mechanical/technology systems failure, human error, passengers, crew, staff, civil insurrection, war, adverse weather and environmental damage. Shipwrecks and considering other coastal/environment/climate and climate change present emerging maritime risks to provide training and research across Africa. An increasing number of uncertain environmental risks are proliferating including the rate at which environmental damage will occur/be enforced against violations, the magnitude of related impact externality costs, changes in related technology and the level at which future emissions growth rates will occur. This subsequently affects the rate at which global climate change will occur and potential cost consequences for the future of Operation Phakisa/AIMS

The most frequent maritime vessel risks, under-investigated for Africa include collision, grounding, fire, mechanical repair and electrical systems failures, being holed on a shoal, hull failure, human error/navigational failure, terminal fires/explosions along with environmental risks including pollution, noise, light and emissions.Hazardous risk events exist during all vessel operation stages from embarkation to departure including injuries, violence, terminal fire/explosion, collapsed gangway, reduced visibility, situational management –myriad events, medical evacuation, engine failure, complacency –high docking and sewerage spills. Legal/Regulatory create further risks to evaluate. The ultimate risk is that of indifference –of discordant, apathetic stakeholders who fail to act and respond to opportunities; even when such is actively promoted and in their self-interest. Risks could continue to emerge from retaliation internationally, to automation to war and climate change to the fragmenting of globalisation to increasing vessel size to the rise of China to an oversaturated cruise and cargo vessel market capacity, to uncertain demand forecast prospects for Africa’s proposed port expansion. Perhaps the most uncertain risk will be if Operation Phakisa, a maritime university/SAIMI and AIMS themselves are ephemeral templates, destined to fade… without being legally enshrined/constitutionally protected with secured, sustainable funding, human/research resources, support and economic developments.

## 2.27: Maritime Security#, Cybersecurity, IT

Whilst maritime law enforcement and navy sections focus on physical maritime security aspects, customs concentrates on trade/biosecurity; maritime health on health security and Maritime Risks/Uncertainty and Futures target proactive unknown hazards; this section further considers the increasing need for electronic maritime security including cybersecurity. This would provide a further emerging maritime area not provided across Africa’s higher education sector, for SAIMI/an African maritime university. Although Africa has few specific maritime security threats/capacity; it experiences the challenges detailed under maritime law enforcement. It defends laws and sovereign integrity, counters piracy, smuggling, poaching and fisheries pillaging. These all require the need for stealth, maritime electronic measures and countermeasures, aside from protecting Naval/cruise/cargo vessels/ports and key maritime assets from emerging cyber and physical security threats. Whilst Africa in general and South Africa in particular, has extensive experience in conventional, physical, security technology, equipment and training given its past experience; this has not been developed for a marine specific context as a future research and skills development area. Given how our world cannot afford utter paralysis of world maritime supply chains, trade, navies and other maritime connections if attacked; South Africa/Africa could seize the initiative and develop countermeasures to IMO standards,

As vessel traffic and stakeholders multiply under an ocean economy future, so potential hazards proliferate. Specific maritime electronic security technology remains globally in its infancy to protect maritime internet/satellite/information/communication and defence channels outside conventional navies. Other law enforcement/police/ research/cargo/cruise and general vessels requiring safety and physical/personal security; will need improved encryption and maritime electronic countermeasures. This report proposes future research concentrate on adapting and improving South African/African/global security measures including electronics/bank security. This needs to ensure all necessary communications/information are well protected against risk threats. Specialised laboratories, training guides, companies and products could be locally formed and sold. E.g. including more secure maritime finance transactions/IT, spectrum analysers, receivers, transmitters, satellites, cables, receivers, radio, radar, sonar, AIS tracking, scopes, non-linear junction detectors, security access and remote operating, (aside from conventional security). Courses would combine practical experience in random security scenarios/response training with assemblage/disassemblage. Our continent could benefit from developing export opportunities to others similarly concerned. Australia is targeting electronic warfare sensors and effectors, warfare tactics, techniques and procedures, System level optimisation, satellite protection, cybersecurity and electronic intelligence, electromagnetic (EM) interference suppression and avoidance ISR, command and control systems. It is focusing on cryptography, precision geo-location and quantum technology.

## 2.28: Maritime Technology#

As with other sections, this report proposes investing in another novel maritime area not currently a focus of Operation Phakisa but instrumental to its prospects germinating. Maritime Technology would have several focuses. Most imperative is ensuring that all aspirant technocrats have the capacity, resources and support to transform their visions into concrete existence, as with the other course areas. Therefore, those with ideas will be actively supported and patronised, as detailed elsewhere in this course. Any of this section’s areas offers the chance for Africans and those who wish to be a part of this; to radically experiment across the marine economy, supply/value chain or direction of scholarship. However, this course will not only provide laboratories/facilities and funding in exchange for mutual profits for viable ideas; it will provide those with whatever skills/interests/facilities needed. Guidance will instruct participants in how to compose funding/research applications, where to obtain information; research/technology design, testing, method, implementation, results, conclusions, monitoring and evaluation. It annexes risk management, intellectual property and copyright; marketing, publicity; publishing; writing, communication, information and networking. Whilst maritime technology prospects could be infinite from floating, self-supporting city habitats and underwater economy to drones and satellites to improving produce lifespans to health to mechanics/electronics to countering climate change; specialised institutes i.e. SAIMI can provide a more centralised source to channel cogitative dissonance into creativity. Aspirants could propose their ideas. They might seek to specifically solve set challenges/outstanding maritime/other related problems. They could find specific maritime applications from existing products, technology, concepts and innovations or non-maritime applications derived from existing ones.

## 2.29: Maritime Warfare

To ensure peace, Africa must be prepared for warfare. In establishing Operation Phakisa and AIMS there may be a time where South Africa and other African maritime powers may need to be defensive/consider the offensive to preserve its territorial sovereignty, resources, borders, assets and citizens. This is crucial given potential hazards; risks and uncertain futures, prioritised by other curriculum areas. However currently, our nations lacks the institutional capacity, the training, experience, expertise and research; the tactics, strategy, logistical arrangements, allies and awareness of maritime warfare of other continents. Historically, these factors, naval and maritime law enforcement capacity have remained a lesser, trivialised concern to army, air force and even nuclear power. During apartheid; the South African Army Commander even nefariously proposed abolishing the navy, (despite being one of the few in Africa), as he saw no point to devoting any resources or where it could make any difference. However, in developing a maritime economy and future, this report considers that maritime warfare and the later section on Navy training/research need to be developed. It requires specific Africa-centric mandates at specialised maritime defence laboratories/firms/schools as part of a coordinated maritime university/centre.

Currently South Africa relies on its Naval College, SAS Simonsberg Headquarters and the SAS General Botha. However, limited attention has considered maritime warfare from an African perspective. Considerable potential exists for South Africa to pioneer this area in research, technology and training to consider African maritime warfare solutions to emerging risks, law enforcement issues and maritime security challenges. The future of African maritime warfare could assess potential South African/African offensive/defensive capacity, improve chartering the oceans/access to climate/other data to exploit geophysical advantages. It could consider the implications of migrants, climate change, blockades, sanctions; conflict with various African states/coalitions, Southern hemisphere and global powers. It could train for enhanced flexibility across the Atlantic, Indian and Antarctic Oceans; consider refurbishing stockpiles and existing navy facilities. However, other African nations have rivers including the Congo, Zambezi, Nile and the Gambia, a variety of terrain for amphibious warfare and marines and generally far weaker maritime assets, poorly concentrated and vulnerable. This may require South Africa to assist other nations, whilst modifying its own maritime warfare doctrines, research and experience. This report proposes maritime warfare consider electronic/physical safety and security; natural disaster responses, improved stakeholder integration and information awareness. Local maritime warfare will need to consider how to improve recruitment, encourage voluntary reserves and patriotism if necessary and employing marine contact/enlisting others to provide intelligence. It would have to assess implications of territorial violation, enforcing laws of the sea/international regulation and investigate forming partnerships with other African/international navies.

Maritime Warfare considers identifying and improving the security of core maritime assets from information sources/networks including satellites, to physical facilities. It needs to consider public/community relations and psychological warfare more convincingly. It must be more willing to employ espionage/sabotage, intelligence and counter-intelligence –linking to those services, army, air force and maritime law enforcement units. Research needs to evaluate Africa’s own maritime history and the past/present of maritime warfare from Carthage to the Falklands and beyond. For example, tactics could be learnt from Somalia/Gulf of Guinea corsairs –using small stealth tactics over larger vessels. South Africa/Africa needs to adapt tactics to consider improving coastal defences if needed, protect strategic infrastructure and possible auxiliary capacity on its locally flagged fleets. It ought to consider the implications of laws/conventions applying to warfare. South Africa could possibly reflect on nuclear/chemical/biological warfare with maritime modifications. It needs to consider the most effective deployment of vessels/resources under multiple scenarios with joint exercises between African navies. It also needs to avoid the mistake of committing resources to financially subsidise/prop up weaker powers, unsustainable in the long run. Ultimately, Africa’s maritime warfare tactics need to consider sustainable funding and being able to operate autonomously when necessary. Greater rotation of lecturers, officers and crew would broaden experience. Tactically, having mobile vessel headquarters with considerable autonomy as well as a naval headquarters inland in Pretoria does reduce the traditional vulnerability of coastal fixed bases. Mobility provides the greatest chance for flexibility and initiative. Ultimately, Africa needs its own textbooks, strategies, experience, resources and maritime industry with scholarship and instruction, to ensure its waters and resources are not taken for granted in a tumultuous world.

## 2.30: Naval Architecture, Shipbuilding, Salvaging and Repair

If there is any further reason why this radical structuring is absolutely necessary, it is how can Operation Phakisa ever become a reality without a central vision of maritime education? Although South Africa has a several registered naval architectural firms and shipyards, a South African Institute of Marine Engineers and Naval Architects, although it is proposing localised procurement and an African merchant naval fleet and cabotage; it currently offers not a single diploma, degree, laboratory, library or university chair, lecturer, researcher or locally trained student, patent/technology or research paper in specified journals abroad. Aside from introductory first year courses at CPUT and Stellenbosch, there is no African equivalent. And yet Africa wishes to develop its own future of shipping! This report considers that if Africa is to construct its own fleets, it needs qualified naval architects with maritime university SAQA/SAIMENA/SAIMI accredited qualifications and researchers apart from professionals involved in shipbuilding, salvaging, repair, alteration and demolition. This mandates practical skills and research theorists able to improve designs. It could form partnerships, networking with equivalent societies of professionals in Shanghai, Japan, the US, UK, Australia, Singapore, Hong Kong, Greece, Serbia, Poland, Germany, Turkey and Iran plus the US Society of Boat Designers. IMMAREST offer branches in Egypt and Nigeria but few trained professionals.

This report proposes aligning courses with international degrees and registered professionally. Naval architects focus on vessel and offshore/maritime structure design and engineering. Similar to land-based counterparts, it requires significant mathematics, drawing and IT skills, the capacity for teamwork, communication, risk management, history and ocean physics. Other areas include regulation, surveying, marketing, business, hydrodynamics, hydrostatics, aerodynamics and information. It proposes local textbooks, vessel projects, research laboratories, devoted funding, careers guidance and mentorships/internships with existing firms/ties to related journals and professional subjects as with other course areas. SAIMENA even offer an education fund for aspirant naval architects/marine engineers. It would propose linking to the IMO and Confederation of European Maritime Technology Societies, aiming ultimately for specialised departments, a journal, conference, prizes, competitions and scholarships for Africans, more shipyard/naval architect firms; patents and technology/African societies affiliates to SAIMENA. It could learn from the International Standards Organisation Technical Panels on Small Craft/Ship and Marine Technology, IAPH guidelines and others. We could pioneer our own propulsion, maintenance, control, production, auxiliary and other systems, considering underwater design/operations.

“*A naval architect should be able to design, draw, calculate, lay down, cut out, set up, fasten, fit, finish, equip, launch and send to sea a ship out of his own head. He should be able to tell beforehand at what speed she will go, what freight she will carry, what qualities she will show in a sea, - before it, athwart it, against it, - on a wind, close hauled, going free, - what she will stow, and carry, and earn and expend. On his word you should be able to rely, that what he says, that his ship will infallibly do.” – John Scott Russell's (engineer and naval architect*), "The Modern System of Naval Architecture",

The University of Tasmania’s Naval Architecture Honours degree represents the customary maritime university curriculum, specialising either in ships and underwater vessels or yachts and small craft. The first covers resistance and propulsion, structural analysis, seakeeping and manoeuvring, finite element analysis, applied ship design, maritime engineering and underwater vessel technology/yacht and small ship design, advanced vessel technology and applied computational fluid dynamics. The UK University of Strathclyde equivalent covers marine transport systems, ship geometry and hydrostatics, ship resistance and computational hydrodynamics. It adds marine propulsion systems, structural engineering; ship motion and wave induced loads, plus reliability analysis of marine structures, maritime law, business, regulation, maintenance and ocean renewable energy. The course would focus on testing the equipment, layout, components and design of vessels/maritime structures. Research could partner with maritime engineering and other ascending sectors.

This report proposes working in partnership with existing stakeholders including professional associations, port authorities, engineers, environmentalists, shipping lines, business, the SA Navy, SAMSA, government, IMAREST, Royal Institute of Naval Architects and others to rapidly develop localised capacity. These would adjust to various African climates, marine environments, piracy, strike and other security considerations; marine ecosystems; cargos, routes, hazards, technological proficiency, port productivity and human resource standards. It would target local vessel types –naval, maritime law enforcement, police, recreational, fishing, cargo, tanker, cruise vessel, pilot, tug, dredger, ferries, barges, mining vessels and oil rigs. Researchers could look for means to improve localised African vessel/structural design and performance including weight, propulsion, fuel consumption and other key indicators. The Royal Institute of Naval Architects distinguishes between chartered engineers, maritime engineers, naval architects and engineering technicians –for differing qualifications. Emerging topics would particularly link to marine engineering/ocean engineering focuses, apart from climate change/maritime risk, failure and hazard management; LNG and alternative fuels. In the future, it could move to submarines and autonomous underwater vessels. It could work on specific African shipping challenges. To accelerate development, vocational training could work in partnership with existing architects/shipyards /stakeholders. It could work on preserving marine archaeology and heritage. SAMSA consider the implications on ocean/maritime engineering structures, technical aid during crises, buoyancy, tonnage and other standard tests. Finally, developing local capacity would avoid the expense of sending students abroad with high risks of remaining there.

## 2.31: Nautical/Ocean Engineering –Ocean Renewable Energy#

From darkness; ocean renewable energy as with solar power, can illuminate our future economy and society. Through establishing a maritime university and education-based economy, these students, researchers and enterprise projects can aim to resolve our electricity crisis of the past decade as an only recently emerging research area. Ocean Renewable Energy is currently experimented in very few global institutions. This has yet to have a specialised university or qualification across Africa/most of the Southern Hemisphere. This report proposes introducing it. We could work with environmentalists/marine conservationists and contact, economists, communities, engineers and electrical professionals, to consider the implications of ocean-based variants on tidal, wind, wave, current, hydro, solar, minerals, hydrogen fuel cell and other potential sources of ocean-maritime vessel-structure based energy. This will ascertain whether it is commercially viable. Other research could consider physical, chemical, thermal, biological, light, mineral, kinetic, potential and other energy forms/processes, connected to oceanography/surveying including reception, storage, conversion, conservation and transmission/reduction Africa could identify Atlases of potential marine renewable energy from magnified coastal and deep-water surveying. It could consider floating structures.

In 2012, the Oceanos project harnessed currents via hydrokinetic motion for electricity but future studies have not been implemented. These would include pilot projects to test experiments/variants/ possible interaction including tidal/other turbines, wave-energy converters and implications for land/oceans/coasts, people and marine ecosystems, ascertaining various risk consequences. If feasibly tested and viable, this could develop marine industry further. Directions for marine economy products and research include augmenting pressure-retarded osmosis (and reversed electro-dialysis, oscillating buoys, floating ducks, snakes, flaps, and enclosed chambers. Marine algae biomass provides another potential aquaculture product. Alternatively, Africa could concentrate on renewable vessel energy from solar and wind power to lowering fuel emissions –hybrid vessels, and biofuels via methods including pyrolysis –thermochemical reactions and biomass. SASOL has excellent synthetic fuels experience.

## 2.32: Navy/Merchant Navy

To ensure an African maritime future, existing navies, training, facilities and research will need to be revitalised, with investment in expanded capacity. Presently, the South African Navy trains abroad vessels, the SA Military Skills Development Programme and then specialised officer training at the Naval College/SA Military Academy and/or Maritime Studies at CPUT. It trains crews, combat officers, weapons operator’s, protection officers, engine room attendants, public relations, hospitality, physical training, hydrography, firefighting, logistics, communication, submarines, divers, a band, student engineers and technical officers. Its Maritime Reaction Squadron provides an elite flexible multi-purpose equivalent of the US/Royal Marines. This provides strategic advantages over other African navies but those navies could benefit from a similar training program under SA guidance. However, each of these areas can be improved and maritime education could focus on the theoretical/practical means, equipment, technology, and navy/maritime future requirements, to enhance maritime security. For example, under communications the current courses focus on Morse Code, Telex Net Ceremonial, Flags and Pennants, Voice and Radio Procedures, Flashing Lights, Semaphore and Microsoft Word rather than those envisioned by an increasingly electronic age and cyberwarfare/security.

Few benefit from specialised maritime education training, even among professional officers. Additionally, across Africa, no navy including South Africa has a specialised naval research focus/facilities or connections and partnerships. Few formal marine economy, strategic stakeholder partnerships exist unlike other continents; (despite Operation Hotel for 60% local procurement). This research proposes ensuring localised procurement including consultants/vessel design etc wherever possible, given economic and security implications. South Africa could develop an African maritime naval equivalent of Armscor/Denel as self-financing/profitable state enterprises in collaboration with maritime businesses. It could work with maritime education institutions/professional associations to promote import substitution/autarky and exports plus granting student’s experience/test designs as with other maritime partners. Specific naval research could further improve our continent’s objectives, sovereignty, security and economic value. South Africa possesses a pivotal role geopolitically, economic prospects, local experience, partnerships and potentially skilled maritime education labour/capital in adapting and developing areas investigated by other global navies. Given resource constraints, it could ensure existing research is also maritime/navy focused. Key research will have to consider maritime security/implications of BRICS/Southern Hemisphere/African navies and maritime law enforcement.

For example, the USA’s naval research incorporates a Nanoscience Institute, a Laboratory for Future Naval Capabilities, a Laboratory for Autonomous Systems Research and a Naval Research laboratory/library, business operations, systems, materials science, space, oceans and atmosphere among others. It also covers security classified, community linked courses in naval business/research needs, security and applications of existing research/information/technology developed when not conflicting with legal/security/other considerations. Naval projects include autonomous drones/aerial cargo/submarine vessels, electromagnetic rail guns; synchronised electronic warfare, electromagnetic interference suppression plus a forward deployed energy and communications mobile, autonomous outpost. Technology Solutions seeks feedback from personnel, civilians and other sources. Research laboratory areas include understanding battlespace environments, electronics, electromagnetic warfare, information technology, material and chemical warfare, underwater warfare and space –phenomena effects, satellite intelligence, navigation, tracking and situational awareness. It offers scholarships and a Young investigator program, mentorships and cooperation/connections with industry/academia.

Future Naval Capabilities cover the following areas:

* **Air Warfare (AW):** Anti-Air Warfare (AAW); Anti-Surface Warfare (ASuW); Anti-Submarine Warfare (ASW); Aircraft, Power Projection; Cyber
* **Capable Manpower (CMP):** Manpower, Personnel, Training and Education
* **Energy, Logistics and Platform Enablers (ELP):** Ashore energy; logistics; maintainability; sustainability; efficiency improvements
* **Expeditionary Manoeuvre Warfare (EMW):** Special Operations Forces; Amphibious Warfare; Mine Counter-Measures; Mine Warfare; Humanitarian Assistance/Disaster Relief; Anti-Terrorism Force Protection; Explosive Ordinance Disposal; C4ISR; Cyber
* **Force Health Protection (FHP):** Medical Equipment and Supplies; Health Care and Protection; Reduction of Morbidity/Mortality
* **Information Warfare (IW):** Sensors; Cyber; Space; Electromagnetic Manoeuvre Warfare; Military Deception; Command and Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR); Positioning, Navigation and Timing; Meteorology; Oceanography; Hydrography; Man-Machine Teaming in support of Information Warfare
* **Surface Warfare (SW):** Anti-Air Warfare (AAW); ASW; ASuW; Defensive Submarine Warfare (SUW); Theatre Air and Missile Defence; Power Projection; Cyber; HM&E
* **Undersea Warfare (UW):** ASW; Power Projection; Strategic Deterrence; Cyber

The Indian Naval Research Board is focusing on hydrodynamics, ocean environment, sonar and signals behaviour, computing, marine systems and hydro-vibration-acoustic research. Brazil’s navy has developed an autonomous, Antarctic research base, nuclear powered submarines, river and inland patrol vessels, radar warnings and anti-submarine torpedoes. Australia’s Royal Navy connects with the Sea Power Centre which autonomously links the public/maritime community/academia to consider methods of improving sea power, strategy and naval potential, encouraging awareness of history and appreciation. Its training emphasises physical fitness –push ups, flex arm hangs, 2.4 km run, sit ups, 500 m swim and the beep test as pre-screening. It covers first aid, community harmony, health and safety, equity and diversity; basic skills; drugs and alcohol/sexual health education; ceremonial, drill, weapons practise and sea survival. Officers’ education includes administration, communications, leadership, strategy/tactics, history, seamanship, navigation, human management/psychology; boat studies, equity and diversity; naval weapons and technology, physical fitness, navy organisation, personal development, health; sea familiarisation and training deployment, security and survival management. The Royal Canadian Navy’s 2012 training program encourages greater use and flexibility of technology including simulators to provide experience; the use of mentorship and a diversity of environments/times and situation scenarios, adapted to multiple conditions. It encourages efficiency, resolve and initiative.

The South African Merchant Navy currently exists in infancy, given its historically declining fleet and registered seafarers. It was formerly trained under the South African navy. However vocational seafarer qualifications still exist under the South African/Maritime Training Academy and other seafarer education courses as detailed below. Significant demand prospects are envisioned under pursuing cabotage, local merchant and cruise fleets/expanding tourism and marine economy/finance choices with awareness. However, this report proposes reprioritising South Africa/Africa’s merchant navy as a core focus of any proposed maritime research, where the other chapter identified areas consider stakeholder requirements and interests. It considers merchant navies could extend beyond the limits of existing seafarer education to equip crew and administrators, to ensure the success of Operation Phakisa and AIMS. They could understand key cabotage and other maritime finance opportunities. To be globally qualified and experienced, African current and merchant navy recruits could learn about proactive maritime risk management; consider uncertainty and maritime futures. They will benefit from maritime health and psychology/incorporating human factors. Areas from surveying to engineering to maritime laws/law enforcement, maritime business, economics and logistics to climate change, maritime safety and security. Maritime history and ocean popular understanding would encourage support and commitment to Operation Phakisa, the ocean economy and a future African maritime sector. A centralised source such as SAIMI could coordinate awareness of courses/vocational information guidance, education and economy prospects/beneficial research and projects/legislation.

## 2.33: Oceanography, Ocean physics, chemistry

Oceanography essentially concentrates on understanding ocean physical, biological, chemical and other natural phenomena, its geography, geology, structure and characteristics. Whilst South Africa prioritised this research previously; it too would benefit from expanded interlinkages to other areas in this section. Aside from the sections in maritime geography, ocean surveying, marine ecosystems and marine contact; this area considers forthcoming directions could extend to understanding the entire African coastline, the Indian, Atlantic and Antarctic Oceans. Currently, it is offered at UCT and CPUT, at research, postgraduate and undergraduate level along with practical aquarium-based courses –Oceanography Research Institute. Courses teach Ocean and atmospheric modelling, Coastal oceanography, Air-sea interaction, Shelf dynamics, Marine climatology, Climate change and variability, Marine and coastal meteorology, Extreme events, Regional oceanography, Chemical oceanography and Marine biogeochemistry. It currently focuses on improving the above areas, climate, environment and ocean-land –atmosphere interactions with climate change plus marine remote sensoring. However, it could consider maritime associated risks, proposed ocean fertilisation, ocean acidification, underwater mining and economic activity, submarines, increased vessels and port expansions. Other areas could concentrate beyond tides and currents to eddies, turbulence, marine renewable energy consequences and ocean circulation systems/deep underwater developing instruments, equipment and technology/pilot projects. Marine microbes and species might be able to resolve human marine pollution.

## 2.34: Ocean Popular Understanding and Enlightenment#

The true challenge in solidifying a maritime future remains to persuade aeons and generations of land orientated Africans across the continent. If Operation Phakisa and the African maritime destiny is to remain more than a momentary fantasy, the oceans, marine environment, economy and potential will need to be popularly understood, appreciated, encouraged, believed and committed to by its citizens, regardless of the rest of the world. This vision inspired this report and other author papers so the ocean would become more than merely another source of resources to pulverise and plunder to extinction, (now that we have ravaged our lands). Therefore, it proposes basic courses that form part of the secondary, tertiary, community and vocational curriculum along with awareness of ecological literacy/climate change. This matters so the ocean sector is seen as a catalyst of change, a trajectory of hope and the answer to so many of our challenges. These courses would focus on the maritime sector’s solutions to those issues that continue to divide us and delay us from securing our own destiny within a greater, more aureal Earth of scholarship, ecological awareness, sustainable maritime education, economy, efficiency, inspiration, culture and exploration

There are two areas to pursue. The first concerns Africans themselves and the second concentrates on those who are to serve as publicists, effectively marketing the ocean in popular understanding and enlightenment whether as researchers, educators, government, business or any other marine value chain stakeholder. The first centres on how to persuade Africans initially and ultimately the world, how to ensure the oceans and maritime sector can be of relevance; interest, consolation, inspiration, personal and general benefit, value, risks and opportunity. It would identify arguments in favour of Operation Phakisa prompting public debates, encouraging scholarships, prizes, competition and publicity as detailed elsewhere in this report. It would ensure citizens are aware of their consequences on the maritime sector and how this affects the coast/hinterland –to encourage them to remove any externality costs, so that we become more ecologically, socially, economically and maritime, secure, safe, sensitive and sustainable. It would concentrate upon our maritime history and future, including funding, project opportunities, research discoveries, our achievements –human, establishing a fleet and maritime university. SAIMI, the Presidency, academia and other businesses could work for legal and constitutional protection of this initiative for the future as the first in the world to commit to it and ensure it has the funding/coordinating centre institution, resources and people qualified in this course area to promote its enduring legacy. It would concentrate on understanding key documents including 2012 African Union, Africa’s Integrated Maritime Strategy, the SADC Protocol on Transportation, Communication and Meteorology and the African Maritime Charter, perhaps this report and previous research.

The second area, derives from the first. By creating citizens who actually want to participate in Operation Phakisa, the quest ensures this can become a reality across not just South Africa but Africa. Academia can help business to market its benefits from the new products produced, to patronise local fleets and enterprises, support extending marine conservation and parks, extend maritime scholarship, ensure maritime health, space, climate change and other areas of discovery are integrated into other areas as co-benefits. Simple awareness provides further chances to facilitate businesses, scholarship, technology and ideas. Research can consider the areas detailed in this report of the media platforms, textbooks and other forms of persuading African’s to value and understand the oceans. This will ensure environmental, economic, social, cultural, educational, legal and physical survival, beyond merely political rhetoric and an electoral cycle more convincingly.

## 2.35: Seafaring -Pilots, Tugboat Operators, Navigation

African crews and seafarers currently depend upon Ghana Regional Maritime University, Egypt’s Arab Academy of Transport and a current 15 institutions in South Africa, aside from vocational courses offered by port authorities/ international shipping companies. South African seafarer training programs include SAMTRA, the SA Maritime School and Transport College, STC-SA and others. However, if it is to pursue African crews, registered cargo and cruise vessels; this report considers the quality and availability of existing courses, qualifications education, training and research will need to be expanded and modernised to ensure supply meets projected demand increases. Current courses focus on STCW code, navigation, first aid, seamanship, communications, survival, search and rescue, security, firefighting, maintenance and other core skills in pilotage, tugs, cargo equipment etc. Future courses would have to meet SAMSA/SAQA seafarer qualifications as detailed under maritime education and other sectors. SAQA has detailed watchkeeper/seafarer qualification standards but few current providers are registered. AMC offer courses as integrated deck ratings/officers, engineers and marine electro-technical officers. They offer specialised firefighting, survival tanks, engineering workshops, own vessels, simulators and workshops.

This report proposes that future seafarers will need to consider benefitting from other chapter identified, maritime education areas. Increasingly, automation may threaten prospects globally and seafarers will be tasked to become more flexible, doing more, with fewer resources. Greater attention/research will need to consider the roles in maritime health/psychology and human factors, ensure marine environmental, safety, security and law enforcement responsibilities. Seafarer education will require benefits from maritime technology, engineering and education advances. It will require greater familiarisation with IT sector, larger and more diverse vessels/cargo management systems. Stakeholders will need greater response rates/agility against unexpected/uncertain future maritime scenarios including climate change and able to adjust to changes in maritime logistics/business/increased customs and regulatory requirements –processed electronically. Research will need to target means to improve worker recruitment, retention, efficiency, communication, information, teamwork, problem solving/initiative and productivity. Previous research has identified problems with simulators, the need for localised case studies/improving basic skills (given second language and other issues), additional vessel experiences and greater berth access for physical familiarisation. Stakeholders need greater vocational awareness of career prospects and marketing/ career development skills. The requirement for seagoing experience before a course is undertaken currently restricts many prospective applicants.

## 2.36: Submarines#

Whilst the future of naval warfare, tourism, maritime research and exploration globally turns to the uncharted depths of our oceans; Africa remains conspicuously absent. Its only submarine capacity remains the few of the South African Navy. Navy training is vocational, with mathematics, weapons, technology, engineering and drawing lacking theory and local submarine training/research capacity –creating significant vulnerability in depending on outsiders to service our submarines. If Africa wishes to assert its sovereign independence and participate in a submerged maritime destiny; it will need to develop more and ecologically sustainable, economically viable submarines, with the researchers, businesses, funding support, facilities, technology and crew to support them. This report considers developing specialised submarine training qualifications, research laboratories/shipyard capabilities that South Africa could specialise and aid Africa in under SAIMI/SAQA and other central maritime education coordinators, as a new area for our continent. It would concentrate on 3 separate areas: naval warfare/maritime law enforcement, safety and security; tourism and maritime recreation; maritime economy, research and exploration; with divergent designs, stakeholder requirements, technology and services. Recently DENEL had to partnership with Germany’s Thyssen-Krupp to service/improve our naval capabilities in weaponry, defences and combat software, lacking any local African speciality in submarines.

However, given our country’s significant experience in engineering, weapons, physical and electronic security/other areas; by developing specific submarine, naval architecture, maritime security, maritime engineering, risk management and other maritime research capacities locally, recruiting from across Africa; this report considers it possible to develop local import substitution of skills, submarine construction, repairs, technology and services. Research could target weaponry, stealth, defences, light, vibrations, engine/vessel design, buoyancy, cargo storage/commercial prospects, environmental sustainability, emissions, fuel, power, water, propulsion, heating, cooling, ventilation, navigation, IT and operating/observation systems. It could consider fire/emergency, safety and security systems plus computational fluid dynamics. This report proposes establishing prototype submarine businesses/facilities to expand cabotage/domestic shipping register; developing marine economy, tourism and exploration/surveying prospects.

Further research could consider maritime health and human factors, maritime engineering and submarine naval architecture, improving surveying and following US the navy in growing vegetables via hydroponics. South Africa could develop commercial submersibles to view African reefs, underwater coastal life, wrecks and marine conservation/archaeology wonders. It could develop tourism submarines to witness the Sardine Run and other phenomena, extending it to cruising across the South African/African coastline. Tourism, maritime business and crew-based courses could be introduced. Future technology could consider autonomous submarines and remote sensors along with the battery powered electric thrusters, non-polluting and implications on marine environment/economy. Africa could introduce its own Project Nemo equivalent, improving upon marine contact and surveying to charter hydrothermal vents, the abyss and other submerged marvels of the deeper oceans, via submarines. Research could improve surface and submersible vessels, navigation, chartering, risk awareness, information, safety, security, telepresence, diving, observation and monitoring systems

## 2.37: Surveying

Although South Africa is a world leader in land, civil and mine/industry-based surveying training and technology, its education has completely ignored the need to charter the ocean/maritime sector to achieve full territorial sovereignty, consider lurking hazards; evaluate its economic potential and monitor its ecosystem/environment status. Only the South African Navy Hydrographic Office and existing registered hydrographic/marine or ship surveyors consider the maritime sector, offering limited vocational courses. Currently SAMSA approve all registered surveyors. This report proposes the establishment of 2 separate surveying courses/training standards, qualifications, research and technology areas: hydrography and marine/ship surveying for maritime education course providers under the auspices of SAIMI/ the equivalent coordinating guardian advanced by this research to safeguard our maritime education and economy. It advances working with existing surveyors, the SA Navy, the Hydrographic Society, SAMSA and other key stakeholders to develop internationally recognised professional qualifications. Connections could link to the IMO, the Society of Consulting Engineers and Ship Surveyors plus the International Institute of Marine Surveying. This Institute’s professional modules include a general introduction, materials and corrosion for vessels, stability, report writing and specialisation in marine incidents, marine coatings, inspecting yacht/small craft engines, systems and mechanical installations. Modules incorporate principles of maritime risk management, law, insurance, hull and other damage claims. Its commercial, ship professional qualification covers draught, different cargo types, large vessel main and auxiliary engines, electrical and electronic engineering, warranties; the International Safety Management Code, helidecks and inspections, classifications; statutory surveys and inspections

Employment within existing and new businesses could be created as cabotage and port traffic prospects multiply from Operation Phakisa/AIMS across Africa, generating education demand. Present marine surveyors conduct marine audits; draught, on and off plus bunkerage, vessel, container, cargo and pre-shipment condition/condition, lashing, cargo loading and unloading surveys, tally, damage and valuation surveys. Other services include marine investigations and price checking. Another firm focuses on vessel security, marine risk, environment and safety awareness training plus navigation. Courses could focus on practical surveyor logbooks and coursework/exams including conducting a physical examination along with understanding the Small Vessel and other codes. In the absence of current courses, existing demand prospects are uncertain for this scarce skill as with seafaring, dependent on a few aging seafarers as a secondary qualification/experience. Yet training needs to integrate maritime law, environment, engineering, technology, naval architects and others. More practical experience using existing shipping forms would benefit new students and surveying researchers.

Researchers could consider improving chartering/surveying and maritime applications of land-based technology and land applications of marine/hydrographic surveying technology beyond paper to electronic forms. Its applications could explore submarines, autonomous vessels, robot probes, remote sensing/LIDAR, removing unexploded ordnance/perils and specialised assessment software. Geoscience Australia consider 3D maps, overlays, radar, sonar and satellites. Future research can target pulse induction, magnetometry, bathymetry and expanding beyond De Beer’s improvement of underwater diamond mining. South Africa could link to marine satellites through its space economy. It could improve and locally produce survey equipment including survey equipment e.g. multi-channel and single channel seismic systems, sub-bottom profilers, sidescan sonars, magnetometers, gravity meters, single beam and multibeam sonar bathymetry systems. It could extend to cameras, oceanographic and gas detection equipment, fluorometers, rock dredges, vibra/gravity and push corers. Research could improve surveying to protect marine ecosystems, economic, communication and other assets from maritime risks and hazards, especially climate change. Other hydrographic survey equipment to produce and train upon include; GPS, echo-sounders, scuba/diving equipment, Motion compensators, Gyrocompass, Computers and peripherals (plotters), Data acquisition and acoustic positioning systems, tools, High-pressure air compressors, Sound velocity profilers, core samplers and fibre optics.

## 2.38: Uncertainty and Maritime Futures#

Most live from moment to moment, on the tasks of the present, at times the intermediate future. Rare are those who consider not just the day, years or even decades but plan beyond the average 5 year electoral cycle of democracy. Thus, even the most promising of ideas fade. Achievements fail, leaving nothing but all too fleeting memories. If Africa’s maritime legacy is not to go the way of Memphis, Thebes, Great Zimbabwe –or even Axum and Carthage; then it needs to consider uncertainty and maritime futures as second only to the concept of Ocean Popular Understanding and Enlightenment, akin to Maritime Risks, Hazards and Failures or Climate Change. This report has devised this as a completely new area in which Africa can further lead Earth, as with the African Renaissance, to ensure an ocean future can exist and remain. Whilst most areas of research concentrate on the past, present, the hypothetical/plausible or the intermediate future; SAIMI/a specialised maritime education university, curriculum and research could devote itself to considering forthcoming horizons of decades, centuries and aeons, in order to reduce disruption costs and minimise future shock.

It aims to do so by considering the future of all maritime related areas, forecasting all reasonable appearing scenarios and probabilities. Scenarios could range from aureal peace and prosperity, to underwater cities or floating habitat like islands, the 6 IPCC most cited, climate change risk scenarios to illegal immigration exodus, to a collapsing ecosystem, to foreign invasion to artificial territory incursions by China to the revenge of species for overpoaching to civil insurrection between political factions to strikes to technology automation taking over the world’s maritime fleet or marine supply chain paralysis; to complete technology and internet systematic failure. It could then focus on the implications for the land and ocean sector. These would consider what are the potential advantages, disadvantages, risks, issues, challenges and opportunities? It would target economic, social, environmental, political, legal, educational and other implications across scenarios and time horizons. It would therefore be able to channel people, finance, technology, business products, students, researchers and other resources into productive and allocative efficiency. Researchers could concentrate on emerging areas and how these can be synergistically integrated with minimal negative externality cost. Parallels exist with Stellenbosch and the Institute of Futures Research. There are too few minds locally and globally truly focusing on a range of likely futures, considering how we and our existing ideals (whether Operation Phakisa or otherwise) might require swift anticipation, preparation and reaction. The pathway to achieving your dreamed future, is to envision it as more than the remotest of prospects and then zealously commit to it, no matter what, other factors may seek to thwart you, otherwise it is doomed!

## 2.39: Underwater photography, Diving

Whilst South Africa currently offers a number of courses in underwater photography and PADI diving including Oceans Campus, Dive School Cape Town, Professional Diving Centre, Sea Dog Commercial School and BS Divers Commercial Diving School aside from Navy/other training programs, these have not previously incorporated into a formal maritime education curriculum. This report proposes SAIMI/equivalent maritime education centres consider formally adding these as course areas to expand the quality of existing training, extend training providers and link research/courses to Operation Phakisa possibilities. For example South Africa could market itself more strategically to develop underwater photography as a means of improving submarine prospects/Navy and maritime defence research; enhance maritime tourism prospects, aid in maritime archaeology and heritage conservation and ecosystem species monitoring. It could work with AFDA graduates/the Navy/SABC to improve the quality of underwater filming/photography. Related courses could focus on improving local marine ecology awareness, assessing future maritime risks and asset conditions from vessels pursued under cabotage/cruise ships to oil rig structures and port expansion infrastructure. Climate and climate change/environmental/coastal processes could be more effectively monitored. Promoting awareness, specialised prizes, competitions, art exhibitions and courses etc could enhance support/popular understanding of the value of Operation Phakisa and a marine economy. Diving could equally promote for recreation, security, safety and other purposes to promote further interest. Research could improve diving equipment, health and performance, –emphasising the practical element. PADI currently offer various course levels from entry to instructor, wreck diving, photography, first aid/EPR, night/boat diving and buoyancy.

## 2.40: Watersports –Maritime Sports research/training#

South African watersports emphasise further opportunities to ensure all aspects of the maritime sector benefit from establishing formal maritime education coordinated partnerships across research, training, business, government, communities, media, individuals and professional associations including the South African Sports Confederation and Olympic Committee, University Sports South Africa, Swim SA, KZN Aquatics and others. Professional aquatic sports include normal, synchronised, advanced and disabled swimming, water polo, diving, scuba diving, lifesaving and bi-triathlons. This report proposes participants can similarly benefit from revised training (as detailed under recreational below), including improved safety, security and risk management. It endorses working with stakeholders to develop maritime sports science, related research focusing on health, psychology, welfare, design, performance, nutrition and technology. Students and coaches could benefit from naval/diving training and experience across environments/scenarios and improving training exercises/facilities –considering water conservation etc. Sports science generally is defined as ‘*the study of human movement from developmental, mechanical, motor control, psychosocial, psychological, historical, pathological, biochemistry and physiological perspectives*.’ However, it is targeted as an novel research are by this author as comparatively few studies/institutions have considered this from an aquatic perspective. This provides a future area for Africa to pioneer the world through a maritime knowledge economy.

## 2.41: Yachting/Recreational

Finally, although practical maritime education exists for Yachting and other marine recreational activities; this report considers a coordinated maritime curriculum, stakeholder contacts, research, legislation, information source and specialised, constitutionally protected, mandated and funded maritime university/Operation Phakisa initiative securer such as SAIMI could further improve these courses. These currently operate with little oversight. Current schools include SA Maritime School and Transport College, SA Yachtmaster Training, Ocean Sailing Academy, Offshore Sailing Academy, Yachtmaster Sailing School, Certified Superyacht Academy, Atlantic Yachting Sailing School, Superyacht Training Academy, Zandvlei Sports Club, Rietvlei Dam Sailing Club and Ocean Star Sailing Academy. These courses generally cover seamanship, deckhand, ocean theory, first aid, safety, security, chef/stewardess interior and exterior training, duties, engines and STCW across yachts, powerboats and other recreational vessels. SAMSA require a radio communication course, first aid, visual and colour acuity.

Participants could prosper from personal maritime health, maritime law awareness, seamanship, safety, electronic and physical security, intelligence access, survey/oceanography/climate findings and risk awareness. African governments/the Navy/ maritime security could recruit recreational vessels as further sources of maritime law enforcements and intelligence given constrained resources. However, providers could work with government/businesses to promote marine tourism and recreational prospects, extending courses across African markets including inland dams/rivers. This could extend seafarer recruitment and practical experience prospects under expanding maritime education. It could establish further work in local shipyards, yachts, yacht and recreational clubs, marine equipment, technology and supplies, enhancing marine logistics, manufacturing and other business prospects. Forming research/business and other partnerships could improve recreation vessel/equipment design including eco-sustainable operations, materials and fuel. These could focus on stakeholder requirements, improving port designs, administration and customs processes, also conducting economic/environmental/community impact cost assessments.

## CHAPTER 3: FACULTY RECRUITMENT

Once endowed with a constitutional mandate and legal authority, a centralised coordinating centre for maritime education can undertake whatever is necessary to achieve Africa’s maritime future era. Determining the ideal curriculum considers existing institutional capacity; the proposed courses to be introduced and research to be prioritised. The next stage considers how to recruit the ideal faculty to establish these objectives in reality, given that the maritime sector and academia locally currently possess scarce skills with few experienced/qualified faculty/administrators. Certain instability in South Africa’s tertiary sector and other constraints exist. This chapter recognises conventional academic recruiting techniques can serve to fulfil general posts. But this report’s aim is on promoting excellence, rather than mediocrity; to be a leading global power in forthcoming maritime scholarship across South Africa and Africa. Ultimately with a specialised maritime university and world renowned faculty, we will establish true academic sovereignty, not beholden to catch up/convergence from outside powers, if we commit to being a leading member of the International Association of Maritime Universities/other institutions.

This report proposes utilising conventional sources –media advertisements, websites, marketing, physical and electronic with physical/psychometric testing/ interviews to discern etc but recognises that this opens up the calibre of applicants to being a random lottery. Our maritime academia cannot afford glacially advancing step by step, we need to ensure African scholarship is directed to Operation Phakisa and our maritime economy/environment –whilst it becomes a top priority –why we still can. Therefore, more radical approaches are necessary. For example, in many key areas we lack specialised local people –or very few untempted by academia. If there is no one suitable from lower echelons of the hierarchy –bring in outsiders –whether the skills need to recruited from abroad (on condition of raining local replacement successors) or from companies. To respond, those with the full power and capacity for faculty recruitment should headhunt world experts abroad in industry, academia, government and professional associations, working with the Department of Home Affairs to grant skilled visa exemptions –accelerated priority for scarce skills. South Africa/Africa’s reputational risks would have to be marketed. Faculty could be promised a high quality of life, reasonable salary-fringe benefits, the chance for research autonomy/support, specialised facilities, publishing/ other support and areas detailed in this report, in exchange for certain conditions (below). Other sources of guest lecturers would be networking/connecting with industry/government and other professionals whether retired or in the private sector to offer services part time as a temporary measure. However, the most promising measures are to screen students –tap Africa’s and the world’s potential –of students/youth bristling with energy, ideas, innovation and enthusiastic zest. Filter their CV’s –approach them directly/indirectly –especially if their experience/qualifications etc correlates to requirements.

Another standard filtering mechanism is to test all prospective applicants for their electronic presence (or lack of one) especially what they reveal through professional and social media networks. Separating those valiant and worthy from time wasters, the degenerate, the senseless, the mediocre, the ignorant, the flawed, the inexperienced, the short termers and hopeless among others proves a major challenge for human resource departments globally. Therefore, tests have to become more discerning, given the benefits offered and the opportunity costs of making errors. To locate those whom are truly worth selecting; it is advised to screen all applications across multiple areas (i.e. what can the candidate offer in ideas, concepts, achievements; skills, experience, qualifications, ideas, entrepreneurship, funding, connections, research/publishing outputs, patents, entrepreneurialism, teaching, student performance, community service/engagement, societies, socially, ambition, commitment, flexibility, responsibility, teamwork and other areas? Candidates would be assessed as to the feasibility of their proposed workload, levels of commitment, expected roles and responsibilities, ideas advanced and attitudes. Their capacity for multitasking, to respond to stakeholder requirements and be available at least sometimes –open door policy/capacity to listen respectfully/responsibly would be implicitly ascertained. The simplest tests are to assess candidates’ relative familiarity with South Africa/Africa’s needs, the tenets, aims and achievements of AIMS/Operation Phakisa and others; stakeholder requirements and awareness/appreciation of the maritime greater sector/education etc. What candidate’s greatest strengths/weaknesses are could be tested through specific simulations/scenarios.

The overall recruitment aim should be to make applicants and recruited faculty valued, prized and willing to maximise effort. Current South African/African faculty could be recruited through intensive career awareness campaigns, targeting existing and foreign students –ensuring that those who qualify for scholarships, graduate, training etc are actually utilised and placed. Faculty recruitment could work on recruiting the gifted yet dispossessed and underappreciated. They might be willing to face an African academic position/future –slightly lower position if there is a genuine chance they personally could be listened to. Many could be tempted to ensure their research matters in reality and be supported given that no other nation on Earth has proposed so radical a restructuring of maritime education/research to serve its maritime economic future. However, this needs to be clarified when targeting prospective employees. All races, gender, country origins, degrees of experience could receive priority over politics so that a continental brain drain does not become permanent. Campuses could provide more academic housing even if temporarily –rent deducted from salary, dedicated travel agencies and other advantages to ease the transition –especially when many, even locally sourced applicants generally have to relocate. Social sessions could be introduced with existing faculty, administration, students and communities to ease integration and transition.

Those with potential or gifted could be attuned further by peer review panels. If several candidates emerge –they could be tested against each other –aptitude tests, improvisation, presentation, capability, points of academic debate etc. A selection panel could comprise of academics/community/business/publishing/psychology-medical-educational experts. –enquiring candidates as to how familiar they are with existing research/emerging trends and where do they envision the future of their personal/other general research? What would they propose if they could design a curriculum, how would they respond to particular risks from riots to climate change? How would they attract funds, publish, network? If they had sufficient resources, where would they direct them and why (including specialised facilities). The calibre of faculty could consider presentation skills –Skype etc. They could be evaluated psychologically: *How would they respond to students under different scenarios. How would they innovate administration, ensure retention and recruitment of students/faculty? What constraints/concerns have they experienced in the past and why would they choose this path. How would they feel about promoting ocean popular understanding? How could they fulfil the national development objectives? What could they personally contribute towards student development and ensuring the survival/prosperity of Africa’s maritime legacy? What is their perspective on working with business/ government/NGO’s? How do they respond to publicity and the media?* Faculty recruitment could be conditional upon mentoring/supporting African’s so we achieve local yet capable faculty too.

Other key questions could include variations of those below designed through this author’s own PHD experience as key questions which caused academic/supervisory relationships in advance. They could be asked what could be improved, what is wrong with their previous/current university regime and what do they consider worked? *What motivates them and why*? Applicants could be probed for their perspective on expectations from students, other academics, administrators and management –and the extent of their willingness to be a part of university life –societies, sport, seminars, publishing, administration, publicity, community outreach, supporting enterprise etc. The point is to minimise tensions/possible failures by not waiting until they’re recruited to test compatibility or potential probability of victory. People may not wish to be involved and that is their prerogative that should not discriminate against recruitment. But it provides more realistic expectations as does considering their most productive work environment. Demonstrating this consideration is also likely to be rewarded with higher motivation and productivity. Screened applicants would be familiarised with academic forms, proceedings and expected requirement, expected to pitch a seminar to fellow academics, a public audience and teach a class of inexperienced undergraduate. Candidates could be indirectly observed for the latter for a more candid assessment –with certain students covertly placed as spies –asked to provoke dissention. Those who have held a diversity of post could be probed if it offers experience/lessons compared to those who have committed to fewer institutions –may be more loyal if less experienced.

**What do you as a supervisor/ expect from a candidate?** **What does the University expect?**

**What is your aspiration/ eventual purpose for a candidate?** **What does the University expect?**

**What is your preferred working approach/environment/schedule?**

**What is your preferred method/ approach of communication?**

**How frequently do you feel meetings are necessary?**

**What are your preferred methods for receiving responses to feedback the candidate feels does not wish to incorporate?**

**What are your perceptions towards possible frequency/ undertaking of publications during candidature? For example should I also be considering locating an article or 2 from my literature review?**

**What are your perceptions towards the value/ frequency of conferences undertaken during candidature –time allocated etc? Does the university/ you personally only consider support for 1 international conference or would you consider any additional local/ international conferences in exchange for publicity/ other requirements etc**

**Do you have co-authorship preferences or any views on authorship?**

**What is a realistic amount of time that you as a supervisor have to dedicate towards my work –contact time versus non-contact time as a reasonable average? What do you consider a fair turnaround time for providing feedback on drafts and what time do you consider reasonable providing notice in order to complete administrative tasks etc leave, supervisor relationships etc?**

**What is your preferred approach as a supervisor –issues that you particularly focus on for a candidate –to assess the extent of your strengths –-I.e. what particular issues of grammar, structure, style/ content strike you as particularly necessary, of value to an extent and what weaknesses need to be avoided?**

**What in your professional opinions do examiners particularly prefer/ dislike?**

**What is a reasonable number of drafts for each chapter before being able to move on –given that the final revisions will occur afterwards?**

**What time periods will you be completely unavailable/ only partially present**

Candidates’ personal backgrounds would be considered –including family ties as an indication of the willingness to remain. However, for older candidates with scarce and valued sills, provided they are willing to accelerate and train successors they could retain the benefits but more flexible/shorter contracts. A policy of phased in Africanisation –based on meritocracy and experience –but accelerated could reduce volatile student protests. Flexible study hours, academic leave, conference support, awareness of funding opportunities/support/, personal, legal, psychological and other support to familiarise themselves with the South African/African context sympathetically could entice foreign applicants as well as sensitising/conditioning students of their valuable sacrifice/willingness to share and contribute towards maritime economy/education’s enduring success. They could be asked to critically assess the strengths and weaknesses of existing academia, styles they would introduce, promised local publishing supports and chance to network/integrate. Considering and emphasising health/welfare and quality of life as inducements, reduces the need for over lucrative salaries –promising academic freedom. They would have the right to appeal against excessive bureaucratic constraints that hinder their research progress and be shielded from factionalism –carefully consider any accusations by an impartial tribunal with no connections/conflicts of interest. Subsidiary goals in recruiting faculty are efficiency, capacity for innovation, resolve and determination. They would be assessed to consider what motivates them and what dissuades them –aim to ensure retention until voluntarily leave or are superseded/better successors arise.

Faculty recruitment can become more decentralised and flexible with electronic media to offer more online courses so that faculty can deliver them from home or even not from a physical campus, minimising the need for interaction/campus facilities etc. This might encourage more outside Africa to partner with those in Africa –they could be offered temporary visiting fellowships/guest lectureships given physical presence can benefit students and faculty. Partnerships could be offered with African and global universities to ensure that any joint program or training offered –extends to mutual cooperation over ensuring the quality of their applicants recruited. More institutions could cooperate to ensure the quality of applicants and their qualifications so that we in Africa do not receive substandard staff masquerading as professionals. Existing faculty would have the options of being rotated, the chance for existing academic leave paid for to enhance qualifications/experience, dedicated conference/funding schemes and other areas detailed in this report. Those willing to sacrifice in remoter towns/rural areas would receive higher wages/fringe benefits as material inducements. Their main incentive should be ambition: What is it that I would like this person to do for me –if I were on the other side? If I am efficient –I will be rewarded with improved career and employment prospects. Only by promoting this, can we stimulate humans to always strive further, more diligently as it is only the chance of potentially more advancement –whether the motive is fiscal; for perks; glory; fame; power; prestige; glamour; influence; insecurity; fear; pathological addiction or something else. Subordinates should not be made to feel inferior but via open door policies –down to the faculty, the students and all levels of supporting staff, to make criticisms and reforms. Rotating inspections –surprise visits; by going into the outer ranks and discover what truly affects all levels is the only way to attain candour from subordinates and to make processes. - Besides it gives executives deployed a greater grasp of the minutiae of an organisation.

If it works –don’t interfere! It is phenomenal to behold how the simplest precepts in governance –Those which are so basically self-evident and self-explanatory are often those people are unwilling to consider and actually adhere to them. There is no point to tinkering with any aspect of an organisation –or to interfere in the lives of individuals or the community –or infrastructure; a system; a concept; idea or activity –if it has proven its mettle and calibre sufficiently in the past (whatever it might be) and is continuing to do so in the future… There are clearly so many problems and issues to face and contend with; that the present or past–has only neglected and ignored –or aggravated… that why waste time, effort and resources wasting the wrong ones? Why persecute those doing as they need and are supposed to be –Why interfere and persecute those just trying to live and get on with their lives/ work etc –Why hound the innocent and the capable with zeal, instead of targeting those who really do require the intervention of others –to save them –especially hose incapable of governing themselves. If one interferes; it only alienates some of the most potentially useful and capable resources available to strengthening the organisation’s structure, future of education, research, projects and people?

People never thank the one who intrudes–who fails to mind their own business –where they are especially not wanted/ desired unless it is actually justified. Society and individuals –seldom… if ever; exalts those who meddle/ interfere when uninvited in the affairs of others –especially when perceived by those parties affected –as not their affair… Interfering is only considered appropriate and socially acceptable when one has something to actually contribute to the matter –or when one agrees/ affirms with the initial formulators of the activity/ discussion. It also is only welcome when it serves as a valid/ desired/ necessary diversion –or when the disturber/ interrupter is worth it.

Offer critics the chance to be in power –The most successful leaders are not afraid to harness the best of followers –or of critics. In fact that is the best form of recruitment to potentially test that being’s potential and character by establishing a particular quandary to resolve –finding out their opinions –and their vision. What is it that they dream of achieving? How can they complement your own institution/ perspective –in a way to mutually find ways that benefit both? It can also be advantageous to test their strengths and limits –the degree of adaptability and other capacities so as to realise where they are most effective and where they are most detrimental (flaws/ vices etc provides a practical modicum of control/ assert influence/ manipulation –that to which they are most susceptible to –enables you to survive any potential ambitions. Those who can resist adversity, temptations and vices without flinching or yielding; –those are the ones worthy of inclusion and entrusting responsibility to –rather than those who clearly cannot.

In fact; it is prudent to never at all potentially deny just how much success relies on effective communication and organisational efficiency –backed up with passionate commitment –at least effort… There are several prime forms of communication to psychologically motivate humanity; including reading; writing; oratory… but also listening…. The most under –rated –yet most effective; is that of listening…. By showing one is listening (or appears to) by not interrupting and allowing people to articulate themselves (even if you do not automatically follow that up with action) you will win astounding volumes of support –as it is the ultimate form of flattery –as most people clearly aspire to be listened to and to be taken seriously. How often is that position aired? “*Oh you just don’t get it, do you?” or “Clearly, you haven’t been listening etc…”* In fact; that is one of the prime functions of an effective organisation that endures … One of the greatest challenges to social/political/economic/environmental instability –is a persistent refusal to listen –where it might benefit us –or at least help to affirm leadership. –When people fell suppressed; ignored; marginalised –or not treated as having an identity, problems surface… That is where most authorities fail… However; one who desires to change an entire education system and economy starting with faculty recruitment –must seek first to convince those who will inspire and guide others to listen to them –are considerate and concerned enough for their plight, to let them articulate their emotions/ perspective but be listened to reciprocally and supported.

The challenge is once recruited to ensure continuous retention by listening and utilising people. Decision making, imagination, resolve, initiative, talent etc should not be stifled but decentralised when recipients accept the responsibilities/consequences of their actions and adhere to laws/policies. Stress, anxiety, fear, pain, misery, conflict, resentment, envy –these factors are human but they are counterproductive. Have trust –and it will be reciprocated. People need to feel that their work environment is not a petty and vindictive sort but actually concerned enough to provide sufficient resources to enable them to undertake work with minimal distractions. Reward innovation; efficiency etc. –ahead of politics, sects, factions etc. These may matter to some –but not in terms of contributing to history; the state, the university and the people... Limited attention has considered the human factor in hiring and beyond. One cannot over organise beings –need to grant them lassitude –especially as an inducement for recruiting the best. Recruitment also consists of continuously evaluating existing faculties’ CV’s and experience to see if individuals deserve to remain hired and in their current position so as to not waste them. Equally if there are those hindering an organisation/incompatible or unproductive there should be mechanisms to swiftly purge them. This follows after they have the right to hearings/appeals –but in consultation with existing faculty. Humans –and academics are no different must want to participate as core of their very drive and personality, if anything is to succeed! The most effective means of faculty recruitment is psychological –ensure people feel as if they personally matter as individuals and are being made the most off in contributing to something as radical and significant as the future of maritime education and Africa. Continuous career guidance sessions/discussions should be implemented every few years/as resources permit.

## CHAPTER 4: FUNDING SOURCES TO ADVANCE AFRICA’S MARITIME EDUCATION

To ensure any institution and project actually materialises, it needs financial resources. This chapter, in recognising the challenges in establishing African maritime education, t ideas, curriculum, faculty recruitment, lab facilities, student support and other areas; summarises local, national, regional and global funding sources. Several types of funding source exist from scholarships/bursaries and training courses, to assistance in specialised facilities, to research and publishing incentives, to collaborative partnerships; to pilot project and workshop seed grants to technology transfer, commercialisation and entrepreneurship to private/public/NGO sponsorship; to research endowments. This chapter ardently asserts that a coordinating maritime institute/centralised maritime university work with all relevant stakeholders within South Africa/Africa and globally; so the areas proposed in the curriculum above are established. Strategic networking, fund raising and proposal writing will remain fundamental to ensuring Operation Phakisa becomes an actual reality, as core skills. Students, faculty and administrators will be assisted and trained so that we of Africa maximise existing and future opportunities. This chapter recognising skills development, timely, efficient and relevant support from networking/key stakeholders but most necessary; informational awareness provides these sources to emphasise that we can learn from the world and all it offers. Then we can return home to Africa in exchange; to offer our experience/resources to support this ocean economy vocation.

Each area in the curriculum presents individual opportunities to target existing universities, companies, government; NGO’s, community/other organisations, crowdsourcing and even individuals. True education considers recognising the gifted potential of any deserving individual and ensuring that they have the resources, support, skills, contacts and opportunities to participate actively, if they are willing, enthusiastic and can make a difference. For maritime education sponsorship, internationally, the Nippon Foundation-UN Partnership promotes Ocean Floor Mapping to promote global ocean governance, which Africa could utilise to identify its maritime resources, mysteries and sovereignty. The partnership with the International Hydrographic Organisation could further improve surveying/maritime geography and governance. The UK based Partnership on the Observation of Global Oceans, Centre of Excellence in Observational Oceanography worked to improve maritime law dispute resolution. If South Africa became a true African member of the International Association of Maritime Universities (rather than Egypt’s Arab Academy of Transport), it could acquire grants in capacity building and network development. The Nippon Foundation has provided research grants for seafarers to enhance vocational training particularly in maritime health, psychology, human factors and vocational training. It provided chairs in Maritime Administration, Marine Environment Management and Maritime Education and Training. The University of British Columbia Nereus Program seeks to predict the future of the World’s Oceans. African students could use this to develop this report’s innovative scholarship topics of Uncertainty and Maritime Futures/ Maritime Risks and Hazards.

The TK Foundation presents another global source supporter of maritime education, especially for the World Maritime University. SPIN offer an international database with maritime related opportunities to search. Terra-Viva Directory specialise in climate change, marine science, environment, aquaculture, fisheries and related areas. Science without Borders, EMBO and IAMONET-RU, offer specific mobility grants or short-term fellowships which Africans could apply to. Individual curriculum focus sectors in Table 1, offer specific maritime-linked education, funding prospects from professional associations/societies as well as the aforementioned key stakeholders. The CLIVAR Network and West Indian Ocean Marine Science Association specifically concentrates on marine/ocean/coastal science related areas including the Harvard University Environmental Fellows Programme. This report also targets general areas which could apply marine centred approaches –including education, health, engineering, law, economics and naval architecture including the US Fulbright Fellowship, the Young African Leadership Initiative, Commonwealth Academic Fellowships; the Columbia Science Fellows Programme, Natural Environmental Research Council, Research Fellowship Scheme, Mandela-Rhodes, Beit and Canon Collins Trust. Other international options include Canada’s International Development Research Centre Scholarships, Regional Universities Forum, Graduate Teaching Assistantships and Turing Foundation Grants for Marine Ecosystems and Sustainable Land Use. Funds including Australia’s Society of Naval Architects and Marine Engineers, OPEC and the Onassis Foundation could be used to promote more funding for other African’s to develop their own maritime capacity by initially participating in our courses, research and institutions. The International Foundation for Science fund those African nations whose per capita GNI is $4,886 or less

This report advocates investigating each individual area specifically for fiscal resources. For example, Antarctic Science is not only supported by SANAP (South African National Antarctic Programme) and the National Research Foundation of South Africa (NRF) –the sole African country committed; but by SCAR. The International Scientific Committee for Antarctic Research offers members the chance to improve local education and research through a Fellowship and Visiting Professorship Schemes, prizes and medals for outstanding research. The Antarctic Wildlife Research Fund and Trans-Antarctic Association specialises in related field research funding for South Africans, Australians, New Zealanders and British. The Challenger Society for Marine Science and ASLO offers travel/conference/research grants. Lloyd’s Register Foundation supports African scholarships in maritime law training –the International Maritime Law Institute. The Indian Ocean Commission (IOC)

(IMO) and International Transport Workers Federation Seafarers’ Trust have further sponsored research and scholarships. Lloyd’s Register Educational Trust Research Unit especially champions research in seafarer experiences, health and vocational training.

Selected examples for marine ecology, biology, conservation and aquaculture are summarised below: The IUCN Freshwater Fisheries Specialist Group and Walton Family Foundation specifically focus on fisheries/aquaculture. The European Marine Research Network is especially committed to augmenting South African institutional capacity building in marine science connected regions. The Global Environmental Facility, Fauna and Flora International, Flagship Species Fund, Idea Wild,

PRCM - Regional Program for Conservation of the Coastal and Marine Zone of West Africa, Prince Bernhard Fund for Nature, Prince Albert II of Monaco Foundation, the Society of Marine Mammalogy, Ocean Care, National Geographic Society Young Explorer’s Grant/Conservation Trust, Royal Caribbean International’s Ocean Fund and the Ocean Fund provide more options. The Total Foundation considers marine biodiversity applications. SANCOR advertise other funding options e.g. the Global Fisheries Sustainability Fund.

* **Association of Zoos and Aquariums Conservation Endowment Fund (AZA CEF) focusing on** animal health, animal welfare, conservation education, field conservation and/or reintroduction, management and/or breeding and research.
* **The British Ecological Society offers Grants for Ecologists in Africa, Research and  
  Community Outreach Grants to aid public understanding.**
* **Chester Zoo, Äì Conservation and Research Grants**
* **Chicago Zoological Society CBOT Conservation of Endangered Species**
* **Critical Ecosystem Partnership Fund (CEPF)**
* **Ernest Kleinwort Charitable Trust**
* **Fresno Chaffee Zoo Wildlife Conservation Fund**
* **Future for Nature Foundation – Future for Nature Award 2014** f
* **John Ellerman Foundation**:
* **MAVA Foundation pour la Nature**
* **Mitsubishi Corporation Fund for Europe and Africa (MCFEA)**.
* **Mohamed bin Zayed Species Conservation Fund**.
* **Patagonia Environmental Grants Program**.
* **People’s Trust for Endangered Species (PTES,) Äì Worldwide Grants**.
* **Prince Bernhard Nature Fund**.
* **Rolex Awards for Enterprise**
* **Rufford Foundation**
* **SOS – Save Our Species**
* **Van Tienhoven Foundation for International Nature Protection**
* **Whitley Fund for Nature (WFN)**

Myriad specialised scholarships and training schemes exist in agriculture/related aquaculture including the Japan International Research Centre for Agriculture; the Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Fellowship Program in Freshwater Science; Australia and New Zealand Aid Scholarships. Others include the Swedish International Agricultural Research Initiative, Australian Centre for International Agricultural Research, John Dillon Fellowship, and Caterpillar Foundation Grants. The International Seafood Sustainability Foundation and SEAPACT are internationally corporate backed initiatives that targets enhancing the sustainability of fisheries and aquaculture. U.S. National Oceanic and Atmospheric Administration— Saltonstall-Kennedy Grants for Fisheries, Save Our Seas Foundation and European Commission provide similar related research sponsorship. The Africa Food Prize and Southern African Network for Bioresources create further incentives for researchers once established. If South Africa/Africa wish to extend marine parks, sanctuaries and research reserves, funding can be internationally obtained through Waitt Foundation Small Grants for Marine Protected Areas and Fisheries plus others. If it wishes to develop its entire overall maritime economy, it could form partnerships under the European Horizon 2020/Maritime and Fisheries Funding initiatives. The Drivers of Food Choice could work towards persuading African’s of the benefits of fish and aquaculture-based nutrition diets.

The Water Research Centre South Africa provides a research fund for aquatic security, conservation and engineering with directed/open calls. Reach UK are one among an increasing number of charities sponsoring Africa water security projects. The Tomlin Fund favours maritime history projects. Mar-Tera concerns include maritime technology partnership Europe and South Africa. The Sweden based Lighthouse Foundation accepts African applicant’s whose ideas/skills could be applied to Swedish maritime challenges. Our students and faculty could learn from partnerships with IAMU members and other maritime education sources so that research, scholarship and innovation can flourish from those with substantial capital to deploy and invest i.e. Singapore’s Maritime Cluster Fund/Maritime Postgraduate Scholarships. Climate change, energy, economics, agriculture and related development challenges have received funding from the following organisations:

* Asia-Pacific Network for Global Change Research
* Climate for Development in Africa, Green Climate Fund, Nordic Climate Facility
* United Nations Framework Convention on Climate Change
* United Nations Industrial Development Organization
* World Meteorological Organization
* Africa Adapt, Africa Enterprise Challenge Fund, Ashden Awards for Sustainable Energy/Trust
* AXA Research Fund; Belmont Forum; Charles Stewart Mott Foundation
* Climate and Development Knowledge Network; DOEN Foundation
* EKOenergy
* Energy Foundation
* ENGIE Corporate Foundation
* Future of the Carbon Market
* Governors’ Climate and Forests Task Force
* KR Foundation; Livelihoods Fund; Minor Foundation for Major Challenges
* Renewable Energy and Energy Efficiency Partnership
* Stiftung Mercator
* System for Analysis, Research, and Training
* William and Flora Hewlett Foundation
* Wuppertal Institute
* Zayed Future Energy Prize
* Common Fund for Commodities
* Consultative Group on International Agricultural Research
* European Commission — Maritime Affairs and Fisheries
* Food and Agriculture Organization of the United Nations
* Australia — Australian Centre for International Agricultural Research
* Brazil — Brazilian Agricultural Research Corporation
* Egypt — Egyptian International Centre for Agriculture
* Israel — Agency for International Development Cooperation
* Japan — Japan International Research Centre for Agricultural Sciences
* United States of America Department of Agriculture
* Agropolis Foundation
* Alliance for a Green Revolution in Africa
* Cargill
* CS Fund and Warsh-Mott Legacy
* Ekhaga Foundation
* FARM-Africa
* French Committee for International Solidarity
* Global Forest Watch
* Innocent Foundation
* International Tree Foundation
* Nestlé Foundation
* Rabobank Foundation
* Right Sharing of World Resources
* Rothamsted International
* Sea Pact
* SEED Foundation
* Southern Africa Trust
* Tzedek
* Yara
* African Development Bank
* African Union
* Arab Fund for Economic and Social Development
* Caribbean Development Bank
* Commission for Environmental Cooperation
* Commonwealth Foundation
* Development Bank of Latin America (CAF)
* European Commission — Development and Cooperation; Environment; Humanitarian Aid and Civil Protection; Research
* OPEC Fund for International Development
* Organization for Security and Cooperation in Europe
* United Nations Development Program, United Nations Environment Program
* World Bank

The following corporations, trusts and organisations have invested in Africa and could be targeted by both Africa and South Africa if the co-benefits of a maritime orientated economy, education and social development system were clarified and motivated to them. They have focused on agriculture, sustainable development, community projects, employment, technology, health and social welfare. G4AW focus on data

* ADM FOUNDATION, ADOBE FOUNDATION
* AMB FOUNDATION, ARTHUR B. SCHULTZ FOUNDATION
* SUSAN AND DONALD BABSON CHARITABLE FOUNDATION
* BAIRD FOUNDATION, BANYAN TREE FOUNDATION
* BD FOUNDATION, BEYOND OUR BORDERS
* BLUE MOON FUND, BOEING COMPANY
* BOHEMIAN FOUNDATION, BRACH FAMILY CHARITABLE FOUNDATION
* BRIGHT FUTURE INTERNATIONAL; CATERPILLAR FOUNDATION
* CHANEL FOUNDATION; CHARLES EVANS HUGHES MEMORIAL FOUNDATION
* CHARLES STEWART MOTT FOUNDATION
* CHINO CIENEGA FOUNDATION
* CHRISTENSEN FUND
* CHRYSALIS TRUST
* CH2M FOUNDATION
* CISCO SYSTEMS FOUNDATION
* CITI FOUNDATION
* COCA-COLA FOUNDATION, COMIC RELIEF
* COLLETTE FOUNDATION
* CONRAD N. HILTON FOUNDATION
* CUMMINS FOUNDATION.
* DAVID WEEKLEY FAMILY FOUNDATION
* DOUGLAS B. MARSHALL FAMILY FOUNDATION
* DRAPER RICHARDS KAPLAN FOUNDATION
* JOHN & ANNE DUFFY FOUNDATION
* DUME WOLVERINE
* ECOM FOUNDATION
* EMERGING MARKETS FOUNDATION
* FLORA FAMILY FOUNDATION
* FLUOR FOUNDATION
* FORD FOUNDATION
* FREDERICK MULDER FOUNDATION
* FREES FOUNDATION
* GATES FOUNDATION
* JOHN F. & MARY A. GEISSE FOUNDATION
* GLOBAL CATALYST FUND
* GOOGLE.ORG
* GRAND CIRCLE FOUNDATION
* GREEN FAMILY FOUNDATION
* GUPTA FAMILY FOUNDATION
* HALLORAN PHILANTHROPIES
* HAROLD SIMMONS FOUNDATION
* HELMSLEY CHARITABLE TRUST
* HENRY E. NILES FOUNDATION
* HEWLETT FOUNDATION
* HORACE W. GOLDSMITH FOUNDATION
* HOWARD G. BUFFETT FOUNDATION
* IDEX FOUNDATION
* IDP FOUNDATION
* INDIGO TRUST
* IRWIN ANDREW PORTER FOUNDATION
* ISORA FOUNDATION
* JACKMAN FAMILY FOUNDATION.
* JEPHCOTT CHARITABLE TRUST
* JOFFE CHARITABLE TRUST
* JOHN DEERE FOUNDATION
* JP MORGAN CHASE
* KANS AND KANDY CHARITABLE TRUST
* KL FELICITAS FOUNDATION
* LAWRENCE FOUNDATION
* ALCOA FOUNDATION
* LEMELSON FOUNDATION
* MARQUIS GEORGE MACDONALD FOUNDATION
* MAI FAMILY FOUNDATION
* MARY'S PENCE
* MASTERCARD FOUNDATION
* MCJ AMELIOR FOUNDATION
* METLIFE FOUNDATION
* MICHAEL AND SUSAN DELL FOUNDATION
* MCKNIGHT FOUNDATION
* M. NIGHT SHYAMALAN FOUNDATION:
* MOODY'S FOUNDATION
* MORGAN STANLEY INTERNATIONAL FOUNDATION
* MOSAIC FOUNDATION
* MULAGO FOUNDATION
* NAMASTE FOUNDATION
* NDUNA FOUNDATION
* NEW FIELD FOUNDATION
* NEXTWORLDNOW
* OMIDYAR NETWORK
* OSPREY FOUNDATION
* PAPERSEED FOUNDATION
* PB & K FAMILY FOUNDATION
* PEERY FOUNDATION
* PENTAIR FOUNDATION
* PEPSICO FOUNDATION
* FRANK PERNELL FOUNDATION
* PERSHING SQUARE FOUNDATION
* PIMCO FOUNDATION
* DAVID AND ELAINE POTTER FOUNDATION
* PRINCE ALBERT II OF MONACO FOUNDATION
* PURELY OVERSEAS TRUST
* ROBERTSON FOUNDATION
* ROCKDALE FOUNDATION
* ROCKEFELLER FOUNDATION
* SACKLER FAMILY FOUNDATION
* SALL FAMILY FOUNDATION
* SATTER FOUNDATION
* SC JOHNSON GIVING
* SHELL FOUNDATION
* SKEES FAMILY FOUNDATION
* SKOLL FOUNDATION
* STARBUCKS FOUNDATION
* STAVROS NIARCHOS FOUNDATION
* STONE FAMILY FOUNDATION
* TOSA FOUNDATION
* TRAFIGURA FOUNDATION
* UNITED NATIONS FEDERAL CREDIT UNION FOUNDATION
* VIRGINIA GILDERSLEEVE INTERNATIONAL FOUNDATION
* VIRGINIA WELLINGTON CABOT FOUNDATION
* VISTA HERMOSA FOUNDATION
* VITOL FOUNDATION
* WAINWRIGHT TRUSTS
* WALLACE GENETIC FOUNDATION
* WASSERMAN FOUNDATION
* WATERLOO FOUNDATION
* WESTERN UNION FOUNDATION
* WESTWOOD ENDOWMENT
* WHOLE PLANET FOUNDATION

Within Africa, forming strategic partnerships at universities could access additional chances of investment including the Australia-Africa Universities Network with Early Career Academic, Grants –UCT and the University of Pretoria are already members. Cambridge-Africa ALBORADA Research Fund and Royal Society offer research/travel and conference/workshop grants. African Capacity Building Foundation, African Development Bank, African Development Foundation, African Foundation for Development, Africa Grantmakers Affinity Group, African Women's Development Fund, African Youth Foundation, African Business Entrepreneurship Network, Arab Net, the Tony Elumelu Foundation and Association of African Universities present additional capital and contacts. The Network of African Science Academies, the International Council for Science; the Africa Enterprise Challenge Fund, African Union Research Grants, the South African National Integrated Cyberinfrastructure System (for maritime security) provide further credence that maritime applications and inspirations do not need to be silenced or discouraged. Existing sources require further publicity and techniques to ensure prospective applicants are not just squandering time and energy. Odinafrica.org mention MASMA grants. The University of Stellenbosch, African Doctoral Academy, African Economic Research Consortium, the Consortium for Advanced Research Training in Africa (CARTA), the Regional Initiative in Science and Education, the African Climate Change Fellowship Programme and Council for Development of Social Science Research in Africa all aim to enhance African backed research and education initiatives, which could further support maritime education.

In South Africa, its National Research Foundation offer the majority of African originated research funding sources in contrast to foreign government endorsed scholarships advertised by the Department of Higher Education and Training or local (South African university) bursaries and the South African Technology Innovation Agency. This agency offers Commercialisation Support and Technology Development funds. NRF opportunities consist of Thuthuka Grants for emerging researchers, Professional Development Block Grants, postgraduate Innovation, Scarce Skills, DAAD, Priority research Areas, and general scholarships locally and abroad. The Foundational Biodiversity Information Programme, Indigenous Knowledge Systems, Support for Unrated, Rated and Y-rated Research and European Research Council partnership offer alternative approaches to access maritime funding. Blue Skies Concepts Notes could be applied to any of the pioneering and emergent research areas advocated by this report in Chapter 3, if all other funding options fail. The Department of Transport and National Skills Funds offer bursaries but currently ignore the needs of Operation Phakisa and the maritime sector economy.

Recent Non-NRF opportunities included Swedish scholarships, Global Innovation through Science and Technology (GIST) Tech-I Competition, SEDA, SAMSA, Skills Development Agency and TETA grants. The Medical Research Council could favour maritime health if motivated, the Development Bank of Southern Africa/Industrial Development Corporation –maritime economics, trade and logistics, SANERI on ocean and marine renewable energy applications. SANSA are relevant to maritime applications of space science and astronomy. SANCOR offer International Travel Student Grants. As part of Operation Phakisa, the following funds have targeted aquaculture, maritime industry and other enterprise/skills development/pilot project initiatives. These include the National Empowerment Fund, Small Enterprise Finance Agency, Isivande Woman’s Fund, Khula SME Fund, Black Business Supplier Development Programme, Incubation Support Programme and National Youth Development Agency. Finally, several South African corporations, governments and other sources offer bursaries.

* AAUW; ABSA; AfriSam Bursaries; Allan Gray Bursaries; Anglo Coal Bursaries
* Anglo Platinum; Aurecon; BBD; BestMed Bursaries
* BHP Billiton Bursaries; BMW Bursaries
* British American Tobacco Bursaries
* Bursary for Software Engineering By We Think; Coca Cola Bursaries
* Construction Education and Training Authority CETA Bursaries
* CSIR Bursaries; David Morrison Bursaries
* De Beers Bursaries; Denel Dynamics Bursaries
* Departments of Agriculture, Forestry & Fisheries/Correctional Services Bursaries
* Departments of Education, Finance, Health, Higher Education, Public Works Bursaries 2017 -
* Social Development, Transport Bursaries
* Ekurhuleni Bursaries; Ernest & Young Bursaries; Eskom Bursaries
* Exxaro Bursaries; Fidelity Fund Bursaries
* First National Bank Bursaries
* First Rand Laurie Dippenaar Scholarship
* Fullbright Scholarship & Bursary Program
* Funza Lushaka Bursary; GIBB Bursaries
* Glencore (XSTRATA) Bursaries; Gold Fields Bursaries
* Great North Transport Bursaries; Harmony Gold Bursaries
* HAW & INGLIS Civil Engineering Bursaries; HCI Foundation Bursaries
* HESA Commonwealth Scholarship/ Bursaries
* Inscape Bursaries 2017 for Disadvantaged Learners; Investec Bursary; ISASA Bursaries
* Kantey & Templer Bursaries; KPMG Bursaries
* Kumba Iron Bursaries; KwaZulu Natal Bursaries
* Lonmin Bursaries; Mayoral Bursaries
* Mercedes Bursaries; MERSETA Bursary; MINTEK Bursaries; MTN Bursaries
* MultiChoice Bursaries; Murray & Roberts Bursaries
* National Treasury Bursaries; National Youth Development Agency Bursaries
* Nedbank Bursaries Program; Netcare Bursaries Programme
* NMISA Bursaries; NSFAS Bursaries
* Old Mutual Bursaries; Oxford Graduate Scholarships Bursaries
* Palabora Copper Bursaries; Petra Diamonds Bursaries
* PWC (Price Waterhouse Coopers) Bursaries; SA Military Bursaries Program
* SAB Bursaries; SACEMA, SAICA Bursaries
* SAMA, SANSA, SAPPI, SAPS Bursaries, SARS Bursaries
* Sasol Bursaries; Shoprite Bursaries; Siemens Bursaries; Sizwe Ntsaluba Gobodo Bursaries
* SPOORNET (Transnet Freight Rail) Bursaries; Stanlib Bursaries
* Stefanutti Stocks Bursaries; Study Trust Bursaries
* Sun International Bursaries; Telkom Bursaries; The National Skills Fund Bursaries
* The Rhodes Trust Scholarship/Bursaries; TISO Foundation Bursaries for Disadvantaged Youth
* Unilever Bursaries; Vodacom Bursaries; Volkswagen Bursaries

## CHAPTER 5: LABORATORY FACILITIES

Another factor imperative to the future of African maritime education includes funding, supporting and creating specialised laboratory and experimental facilities for the proposed curriculum/research areas. If Operation Phakisa is to become a reality; it needs to consider facilities capable of producing the research, education, practical training, experience, experiments and potential indispensable for Africa to assert is maritime sovereignty. This report proposes forming these specialised facilities. This is further inducement to psychologically aid recruitment of faculty and students with the chance to be at the forefront of maritime scholarships. As Africans our facilities need to be internationally competitive yet prioritise African solutions to our problems and stakeholder requirements. Current specialised maritime laboratories exist to a very constrained extent, isolated from our maritime economy, education and research requirements. Until we have our own expanded navies and independent mercantile maritime fleets, researchers and crews established, laboratory maritime simulations and experiments can focus on catch up/convergence growth learning from others… There is an evident need for advanced and accelerated maritime training which our few existing vessels and facilities are currently incapable of addressing without enhancing existing training, technology, equipment, simulations and processes.

This report considers maritime laboratories can be established across the subjects but distinguish between practical and simulation-based facilities/paths of research. Existing African maritime simulation and technology facilities include port authority and private school various tug, pilot, dredger (recent acquisition for Africa’s first) and other vessel related simulators. Currently there is one African maritime software company –Maretek, based in South Africa. The Arab Academy of Technology, Science and Transport offers a virtual Helmsman Steering Lab, Seamanship, Maritime Safety, First Aid and Firefighting ‘Labs’. Nigeria has just created a maritime training simulation facility (Hudson Trident Training Centre). Globally, these concentrate on maritime automation, seafarer training/navigation and human factors related research. Flinders University’s Centre for Maritime Engineering, Control and Imaging emphasises robotics and automation. Its programmes target Advanced Control Systems, Autonomous Underwater Vehicles; Robotic Terrain Vehicles, Structural Reliability, Video and Image Processing. Latrobe University’s Maritime Simulation Laboratory considers ship operations, navigation and automation. South Africa’s practical marine science facilities include the Sharks Research Board, various aquariums and the Southern Ocean Carbon and Climate Laboratory. This contains a SO Observational Engineering R&D facility; Robotics and Ocean profiling (CSIR-STS-Universities); Iron (Fe) clean analytical, experimental facility (Stellenbosch University), High precision CO2 and pCO2 Facility (CSIR); Bio-optics Research Facility (CSIR); High precision, Nutrient and Oxygen biogeochemistry facilities (UCT).

To advance, this report proposes creating independent specialised African equivalents that could learn from Australia and existing maritime universities, given limited existing professional capacity in core subjects including world maritime engineering/naval architecture. For example; the Australian Maritime College/University of Tasmania proclaiming itself to be the southern hemisphere’s leading provider of maritime education includes a Maritime Simulation Centre across a diversity of vessel types with full-mission ship's bridge simulator, two 360-degree tug simulators, an advanced dynamic positioning bridge simulator; six basic dynamic positioning simulators, full mission engine room, six ship operations cubicles and an 18-seat electronic chart display lab. It offers a 35 metre Model Test Basin with wave maker and digital motion sensor systems. Its Emergency Response Centre includes a deep pool, Marine Firefighting fast rescue crafts and survival training centre. It hosts a circulating water channel, bubble chamber, cavitation research laboratory and tunnel to conduct hydrodynamic experiments. It possesses a diesel spray test facility, a 100 metre towing tank and several training vessels to offer practical experience. It has recently completed an advanced Autonomous Underwater Vehicle Facility with separate vessels for ocean surveying; hydrodynamic testing and Antarctic research. It also includes the Research Training Centre laboratory for naval design and manufacturing.

The United Kingdom has pioneered maritime innovation consistently over several centuries. Its University of Strathclyde Glasgow offers multiple maritime laboratory facilities. The marine engineering laboratory is soundproof with heat rigs and a diesel engine test bed. It offers a hydrodynamic laboratory with 21 metre towage tank. Its maritime computer laboratory is equipped with the following Table 7 specialised software, which could aid local facilities if evaluated/procured. It also offers ship models and the obtaining/testing of core maritime engineering related developments. The University of Newcastle’s marine engineering laboratory also provides a diesel engine, test bed with devoted marine, engineering and electronic technicians. It includes a research vessel, cavitation tunnel, a hydrodynamic laboratory with wind/wave/current tank, flow cell and a marine station with workshops, offices, guest facilities plus a recirculating saltwater aquarium. It offers a range of load cells, 6 axis devices Vectrino 3D Ultrasonic Water and Differential Pressure Sensors, Pitot Tubes, hot film anemometers the Qualisys IR Tracking System, along with video and still shot photography.

Table 7: Maritime Engineering Laboratory Software

|  |  |
| --- | --- |
| AVL | Mathcad 15 M030 (x86) |
| Ansys | MATLAB R2014a (32-bit) (x86) |
| Autodesk 360 | Maxsurf 20 v8i x64 (x86) |
| Autodesk AutoCAD 2014 – English | NAPA 2015.3-3 Uninstall Client (x86) |
| CD-adapco STAR-CCM+9.04.009-R8 for Windows 64 | NAPA Designer 2015.3.4 |
| DNV Software | OrcaFlex 9.7 |
| Flexcom 8.2.3 (x86) | PTC Mathcad Prime 3.0 |
| Lloyd's Register RulesCalc 2014.0 edu (x86) | Rhinoceros 5 (64-bit) |

Iran’s Sharif University’s marine engineering laboratory merely provide ship and marine structure design and ship model, test facilities along with simulators and software. Laboratory Equipment includes a Towing Tank, Cavitation Tunnel, Wave Maker, Hydrostatic Test Facilities and Model Making Workshop. The US Merchant Marine Academy mention diesel and steam engineering, refrigeration, marine engineering, thermodynamics, materials testing, machine shop, mechanical engineering, welding, electrical machinery, control systems, electric circuits, engine room simulators and graphics for their marine engineering laboratories. Its laboratories also explore maritime security with acoustic sensing, radar, electro optical and infrared cameras, operational triggers (seismic, magnetic, acoustic, video, radar), technical reconnaissance systems, mobile and liquid robotics platform systems.

The University of Newcastle’s marine science laboratory retains a closed seawater system, experimental cabinets, deep water tanks, an Algal Culture Suite and aquarium. It offers a computer controlled force gauge and Pressurised Water Jet, a contact angle goniometer, a Molecular Biology Suite and EthoVision Video Tracking System and Simi Motion® 3D Tracking System. It possesses a sperm class analyser, several aquariums adjustable for temperature, salinity and photoperiod and four commercially available re-circulating filter systems. It offers services in motility, concentration, morphology and DNA fragmentation, uHPLC and Mass Spectrometry; freeze drying of samples, Gas Chromatography, an Air-Sea Gas Exchange Tank, Spectrophotometers -3D Fluorescence, UV-Vis and Microplate Fluorescence plus time lapse video microscopy, digital image capture and high speed video capture. It offers UV sterilisation, trickle bio-tower and fluid sand filtration, protein skimming and ozonation. Other facilities include a Constant Temperature Room, Aeration air pumps through Hepa-Vent filters, Autoclave sterilisation, Microbiological Safety Cabinets and an LED Photobioreactor. Pacific Northwest National University offer boats and divers. Its marine sciences laboratories present Arsenic speciation, Mercury, sulphide and chemical analysis, radiochemistry labs, and mycoremediation.

Woods Hole Oceanographic Research Institute in the US, offer dry and wet laboratories, specialised vetinarians and the capacity to cultivate and procure multiple species of flora and fauna. It has research holding rooms for injured or diseased organisms, a necropsy room, histology and microbiology/parasitology labs, and a water quality/chemistry laboratory, cold rooms and tissue culture rooms. An equipment/species shop and dedicated repair facilities commercially operate to aid researchers/raise revenue. It offers electron and light microscopy services. The University of Michigan’s maritime laboratories have channelled ocean renewable energy, sustainable harnessing and a VIVACE converter for hydrokinetic energy. The US National Renewable Energy Laboratory established a structural test lab, a Controllable Grid Interface plus dynamometer facilities. Oregon State University are testing wave energy generators with a tsunami wind-wave basin.

In response, this proposal for the future of African maritime education considers the need to revitalise maritime laboratory design to incorporate the most sophisticated elements emerging. In the absence of existing facilities; this design needs to actively consider key stakeholder requirements and priorities; intended current and future research; teaching; student projects; experiments; the community; individual inspiration; international collaborators; faculty team and individual plus media/investor/other demonstration laboratory stations and the university. Maritime facilities need to avoid conventional research bias and other flaws by not presenting experiments/outcomes as tainted by artificial conditions, seeking to replicate the ocean/aquatic environment, climate, ecosystem, risks, facets and factors as accurately as possible. Laboratory design needs to consider the key requirements in Table 3. To minimise intrusions and setbacks to research progress; the core aim of design should be to avoid distractions, peaceful, environmentally sustainable, cost optimal and be as autonomous and autarchic as possible. Therefore, it should have separate Internet high speed encrypted connectivity; renewable energy generated/ independent rain and wastewater systems. Data could be physically transmitted/backdated –disused mines/deep shafts and electronically through a hyper secure online Cloud equivalent data haven.

Table 3: Maritime Laboratory Characteristics

|  |  |
| --- | --- |
| Land | Physical safety, security and risk management |
| Funding – Venture Capital | Information/journals/Library |
| Staff | Communication |
| Training | Networking Contacts |
| Specialised/Generic Equipment | Vessels |
| Independent water/electricity | Scholarship |
| Internet –high speed | Technology/Electronic encryption |
| Archives/Storage | Ecosystem |
| Simulators and specialised software | Field projects/facilities -testing |

New laboratories could be optimally designed upon consultation/advice of key stakeholders. Those with technical proficiency including other institutions, professional associations and the corporate sector can minimise the wastage of finite assets. Specific legislation/codes could be drafted to regularise and secure these laboratories existence and provide codes of conduct/policy/training for various risk managements/hazard scenarios. Partnerships could collaborate with space/health/other research and their facilities to minimise superfluous duplication of services. Research should be as flexible as possible –tailored to individuals, teams –or various combinations. As later detailed in this report; facilities need to consider demonstration stations to aid in attracting funding but also offering community support with concrete demonstration to aid ocean economy popular understanding and appreciation, among a sceptical/uncertain public. Laboratories may need qualified technicians and IT specialists, dedicated software, training and simulators to support less experienced researchers and students, especially those with ideas but need to convert, apply or test them. These students also require training. For maritime related laboratories to implement practical outcomes for Operation Phakisa; they will need pre-testing, verification and quality control/reliability analysis/inspection facilities, securely contained against projected risks. These may need biometric/other high security to prevent theft/ensure responsibility given expensive equipment/commercial/research confidentiality. Once concepts are tested, facilities will need to consider assemblage/production/alteration of physical prototypes –even possible evaluation for commercialisation.

For Africa to possess maritime laboratories of the future; all pointless constraints that hinder research must be eradicated/reviewed wherever possible. This includes prioritising simplifying ethics/ laboratory and field research permission/funding authorisation/other regulation requirements, codes, practises and legislation. It includes granting individual researchers/laboratory heads considerable autonomy in directing their research, seeking funding, publishing, recruiting collaborators and procurement, subject only to reasonable legal/ethical/other regulation requirements. Researchers/laboratory heads should have control/discretion for funding below a pre-defined target so that expenses such as stationary/books/tools/critical time sensitive inputs do not have to undertake a full bureaucratic evaluation process under current South African University Regulations/the PFMA Act. Greater trust would promote a more conducive research/work environment. Facilities can alter between generalised needs including hygiene, ventilation and sanitation yet flexible to customise to specific research requirements. Establishing laboratories, and workshops not only need to consider stakeholder requirements but the welfare of any test subject or investigator; with sufficient resources, considering safety and security. Access to the most relevant updated media/journals, volumes and textbooks through a specialised library –with technical blueprints, training manuals and practical policies/legislation etc related, available. To aid research; detailed overall laboratory records should not only be expected of individual teams/researchers/students but of any with lab access and overall facilities, securely stored and backed up remotely –not on site. Existing laboratory facilities might also need to be probed and upgraded where possible, especially to accommodate the most recent innovations and discoveries, given rapid changes.

Practically, maritime laboratories could be operated on a self-sustaining financial incentive model, enough for the successes to more than finance any losses/failed outcomes. For example, this report proposes 50% of any post-expense/tax profit is distributed to the researcher/s and students involved, 25% goes to the University/host institution involved to counter any capital and operating costs expenditure, 12.5% goes to operating/maintaining/improving laboratory/workshop facilities and 12.5% goes to supporting scholarships/training for students/academics who could benefit. Research could consider the return on investment/opportunity cost on any existing/proposed innovation outlined above when considering any profit/cost/revenue. Considering these would determine whether South Africa/Africa could also afford any particular maritime related innovation, facility, equipment, technology, service or researcher involved. This also has to reflect whether it is necessary to any particular maritime research’s outcome, would it provide value or otherwise profit Operation Phakisa so that laboratories do not cripple our financial future/academic autonomy. Considering specific laboratory design and equipment/technology/other needs could become an integral part of funding applications –based on physical parameters.

Simulation designs, software, training, charts and experiments could be improved along with textbooks/training sources to be Africa specific above and below water, considering physical/human factors, population, resources, land use, water quality, environment, climate, and psychology. Simulations can be expanded/improved to a range of plausible scenarios including various risks, uncertain futures, local climates/ecosystems. Virtual experiences could encompass augmented sensory inputs to enhance the approximation of physical reality as much as possible. This provides a substitute to rapidly accelerate training in scarce constraints especially with few existing facilities until present. Maritime laboratory research would benefit through access to specialised facilities in other areas including space satellites/various vessels/mines/ecosystems etc. Actual field trips and stakeholder tours would ensure that laboratory design is not isolated from the existing world. Maritime laboratories could be extended across Africa initially partnering with regional maritime education hubs in Ghana, Egypt and Kenya at present. Under supervision/responsibility, these could be hired to any interested and qualified stakeholder especially entrepreneurs. Laboratories can be constantly evolving in concept and need. This research proposes keeping up with future shock and change by continuously seeking feedback and offering decentralised systems/infrastructure/resources that maximise initiative, creativity and serendipity as much as possible. It proposes considering the elements necessary to convert non-lab space into a laboratory environment and conversely. Labs also need to consider the conditions of replicability… How can results be repeated for further validation?

Anything produced needs to factor in risk, the need to minimise externality costs, be environmentally sustainable, technically feasible and locally procurable as much as possible as idyllic research/laboratory constraints. –Its production environment is advised to reflect this. It needs to consider the wellbeing of every species –plant and animal involved where applicable given existing maritime research centres do not value/prioritise facilities with welfare. As a condition of use, researchers could be guided by a common sense based code of conduct for risk management, safety, security and peace. This not only raises ethical concerns but in replicating natural conditions as much as possible; this preserves scholastic integrity/results quality. Replication of reality, reduces artificial constraints of sterile laboratory conditions. Research could consider productive and allocative efficiency –anything produced considers the fewest necessary resources and those most wanted are produced/utilised. It needs to consider the trade-off between competitiveness versus cooperation –in experiment formation, laboratory/facility design and research access. It needs to consider the constraints of laboratories and workshops at present, potential advantages, risks and opportunities, especially in design and if ideas are viable/can be supported. Peace is essential to avoid distraction. Laboratory leadership/management and training should consider issues over funding, ethics, publishing, psychology –dispute resolution/diplomacy, law, media relations, technical proficiency/IT and ecological literacy; risk management; academic administration, business, entrepreneurship, intellectual property/copyright and student/research welfare.

Globally, currently little attention and guidelines exist for specifically designed maritime research laboratories, with comparatively few host institutions that deliberately created them from nothing, across manifold divisions of knowledge. One advantage of designing core facilities from nothing is that Africa benefits from convergence growth and technology transfer without making mistakes of other nations. Another is the chance to attract core funding –offering experimental prototypes/marketing and publicity but also from those willing to design and collaborate with maritime laboratories from the future! From automation to aquaculture, naval renewable energy, health, oceanography, marine science, technology to water security, electronic security to maritime engineering, this will aid in faculty recruitment. It provides not just local but international support for Operation Phakisa and South Africa/Africa as a catalyst for global maritime research. It consolidates our maritime education independence. Our facilities in the emergent areas can provide economic/education opportunities to export to others, given few universities globally have truly thought about the practical designs necessary to favour a sustainable, tangible ocean economy and future. Facility size could therefore consider present and future demand. It is often initially cheaper to factor in redundancy/growth initially –within budget/projected growth. One of the first laboratory research priorities would be to consider what is necessary to develop each of the Chapter 2 proposed curriculum areas including pilot projects detailed in Chapter 6. It could concentrate on the research, equipment, staff, training and designs to prioritise. However, prototypes of local and international existing innovations, technology, equipment, vessels, products etc could be explored for further research/commercialisation ventures. It could focus on maritime specific areas, then maritime applications of non-maritime discoveries or non-maritime applications of maritime discoveries.

## CHAPTER 6: PILOT PROJECTS/FIELD RESEARCH EXPERIMENTS

From laboratories, lecture theatres and libraries; maritime education will need to consider practical field research experiments and pilot projects that convert theory into existence for Operation Phakisa and Africa’s maritime economy. This report proposes the central coordinating authority/maritime university and others consider these critical elements for research curriculum areas whose conditions cannot be replicated under artificial circumstances or for which it is impractical/cost-ineffective/too risky/not viable to re-establish. This chapter also ruminates research is influenced by sterile laboratory/theoretical conditions; considering it beneficial to connect to the local physical environment and reality. It aims at devising facilities where practical concepts can be tested, fabricated or experimented facilitating speculative enquiry and practical innovation. Pilot projects can be motivated under multiple reasons. They enable the empirical verification of theory, hypotheses and ideas. They affirm or reject the consequences of certain actions, thoughts or policies. They enable discoveries and opportunities practically, academically, commercially, socially, environmentally and technically. They assist in ascertaining risk. It provides experience; enhances the validity of research among those sceptical of Africa’s contribution and provides physical outcomes to funders and supporters. Perhaps most of all; it contributes to research progress with actual African solutions and discoveries. Psychologically; it can aid most of all in ocean popular understanding and persuading communities/individuals that embarking on this maritime future voyage was actually worth it and can be effective after all….

Although no formal guidelines exist globally, for maritime education/scholarship through establishing pilot projects and field research; this report is motivated on determining anything that could initiate and assist the achievements of Operation Phakisa/an African maritime economy. This chapter advocates key characteristics that would enable research to prevail in reality, offering key examples to aid stakeholders within Africa and globally. Although not every Chapter 2, identified area can benefit, a core aim of any maritime facility can be to review those areas that can, propose projects, consult with stakeholders, consider the resources, funding and training necessary to succeed. Practical research aids in minimising disruption against uncertainty, aids our competitive advantages; provides multiple spill-over effects, minimises maladaptation, inaction and opportunity costs. Prototypes are necessary before physical production/commercialisation/development, especially considering risks, impact costs, constraints, changes and consequences. Anything proposed may need to consider generic factors including land, capital, funding, resources, technology, human capital, training, experience, equipment, information, communication, security, safety, risk management; timing, testing, monitoring and review. It may necessitate appropriate recording, ethics, legislation and stakeholder engagement, impact and possible publicity.

When considering any field research/pilot project location; experiments need to be designed given local social, environmental, physical, resource, technical and other conditions. Pertinent stakeholder consultation/involvement is absolutely essential –ensuring permission to avoid dissent/tensions. Any experiments should be environmentally/socially conscious and responsible, considering ethics and minimising externality costs – air, maritime and shore based. These need to ensure clean-up and recovery costs are factored in. When involving stakeholders whether human or any other species, academic ethical conventions are advised. Ensuring stakeholder familiarisation with the projects; various implications and any related involvement aids in potential recruitment/support. However, whilst natural coastal/maritime environments and existing facilities may require the above route; this report proposes the necessity of establishing separate, securely operated maritime facilities –on academic/government/ corporate owned/leased land/coastline/oceans. This is imperative to circumvent existing and envisioned core challenges from land invasions to local municipal planning and EIA processes. Under a few circumstances; existing facilities could be extended, adapted or refurbished i.e. the government hatcheries for aquaculture, but generally new ones are indispensable for customising potentially successful concepts. In particular, theft presents a serious South African major problem; so sites need to be secure but the public involved so that they feel the benefits. They need to contemplate the need to respect public property, with patriotism and community emphasis. The more involved/adhered to; the more they are likely to comply. This community approach also aids in student recruitment, funding, business ideas, publicity, networking and other areas to ignite a maritime epoch.

Therefore, the fundamental aim of SAIMI/any coordinating central maritime university/research institute is to consider which research areas could benefit from specialised non-laboratory facilities, which to prioritise and why, for a maritime knowledge-based economy. Stakeholder requirements, existing and future challenges; profitability; innovation and delivering on maritime policy priorities provide certain criteria. Therefore, for pilot projects, this research proposes the formation of self-financing, academically/legally autonomous maritime parastatals –corporations under government/academic partnerships, similar to existing ARMSCOR, DENEL, TRANSNET, ISCOR, SASOL, MOSGAS and other successes. Aside from a cadre of professional corporate based/legal/technical based administrators; it could operate on a decentralised system –based on individuals or teams of researchers, technicians, students, faculty, investigators and any community person with ideas –particularly wishes to provide and develop a concept. The aim would focus on flexibility; providing access, experience and actual chances to gain experience/advice etc for those uncertain about emerging immediately into the private sector –easing the transition. It would focus on maritime specific approaches. For many –including students and communities –they may wish to create businesses but have limited formal training, experience, capital; legal-professional/other advice, seed inputs or knowledge. Providing these parastatals enables simple technology and information transfer, aids networking and access to specialised facilities, not cost effective or accessible alone. Pilot projects could connect to the parastatals. This may provide community awareness and training, where anything learnt –could be passed on directly by the initiators, social media or devoted community outreach/extension officers.

This would further consolidate community support through providing a source of inputs/seed stocks; potential profits and inducements/incentives –even exchanges. Pilot projects could achieve further popularity to the prospects of South Africa/Africa’s ocean economy by publicising successes –but even more unusually failures –so stakeholders know what to avoid. Finally; establishing public parastatals such as in the examples below, might induce the private sector, communities, individuals and academics across Africa; to actually embrace the incentives for the maritime economy, to compete –and act–once they know it’s possible, profitable and sustainable! Psychologically, the private sector would feel more reassured with parastatals that generate significant profits from tapping our unharnessed human capital. Among hundreds of millions of Africans, common sense determines enough ideas can exist… Maximum autonomy, specialised support to channel people and pilot projects/facilities can really incentivise many human beings.

For example one set of pilot projects deserves to be aquaculture. As detailed in a previous report by this author (‘***Harvesting the Coastal Sector***)’; to establish a coordinating mechanism of decentralised aquaculture projects/hatcheries would need to consider the following. Aquaculture differs from captive fisheries, which primarily depend on natural resources to determine economic supply and in requiring an artificial (human managed or mechanical interaction), rather than relying completely on a natural biological growth process. The location of aquaculture differs between ocean coasts/bays; inland freshwater natural waterways or artificial human ponds, dams and tanks which can be situated at any location. Other aquaculture characteristics include variations between intensive, semi-intensive and extensive production processes relating to the aquatic species’ population density and combination of resource inputs used e.g. labour intensive, capital intensive, technology intensive etc. Extensive farm production is more traditional in Africa, particularly among subsistence smallholder farmers using earthen, plastic, concrete or other lined surface ponds with minimal feed, technology imports, creating lower productivity and output than intensive methods. Unlike intensive production, which depends on added nutrients/drugs; extensive methods are conditional upon physical environment and climate risks. Aquaculture industries can differentiate between saline and freshwater species, frozen, tinned, versus fresh produce with different purposes, types and values. Examples include high value finfish, low value bulk fish; mariculture (seafood; seaweed and plants); ornamental pets, mariculture; crustaceans; fish feed fingerlings/fish oil products; pharmaceuticals and toothpaste. Additionally, production methods can alternate between monoculture of a single species and polyculture, where conditional on the species, climate and stocking density/nutrient sources, can be more productive with 2 or more species.

Existing aquaculture industries can be divided into diverse production methods including a circulating system cage culture, rafts; aquaponics, aquaculture ranching, tank and brackish water/marine pond aquaculture. Enterprises can differ in scale of production outputs, employments and revenue turnovers between small, medium and large. Circulation systems are climate protected tanks based on recycling and minimising water consumption. Aquaponics recycles water through crops and maritime species growing together. Cage culture includes maritime species in a source of stored water via floating net pens with considerable risks to water quality and oxygen concentration levels. Cages are cheaper to construct with minimal infrastructure costs and more flexible to moving location/controlling populations but are generally conditional upon existing water sources. Ranching involves breeding younger species and releasing them to grow larger in the wild e.g. salmon. Pond based aquaculture is more natural with cheaper inputs but more exposed to security, predator and physical risks, conditional on soil quality; availability of water and sun, size and species.

To establish an aquaculture industry, regardless of the production process above; requires a number of certain physical characteristics; depending upon the level of envisioned production scale, natural, financial; time; technical knowledge, labour and other potential resources available. These characteristics include a number of fixed and variable project costs. Rouhani and Britz (2007)and Rural Fisheries Programme Department of Ichthyology and Fisheries Science Rhodes University, (2010) outline some through manuals for rural aquaculture.Fixed project costs possibly include the physical land, construction materials, buildings with moorings and walkways, initial technology, equipment, transport, fuel, records, stationary, postage and capital costs relating to establishing the production costs above. This includes any permits and other official, legal regulatory compliance costs. Equipment may include freezers, sorting tables, tools, aerators, harvesting, storage, monitoring, evaluation and pumps. Variable costs are conditional upon the resources mentioned including wages and skills training costs,conversion to species and extension costs, costs of initial fingerling, feeding stock, nutrients, packaging, chemicals/drugs to preserve health, those relating to water, electricity; insurance; security, storage and safety along with marketing, research and development costs. Additional costs potentially include asset depreciation, construction, demolition, repair and maintenance and occasional possible replacement, depending on care by workers. Partnership of African Fisheries (2011) suggest a number of stages that an emergent, prospective stakeholder wishing to invest in aquaculture needs to consider Steps entail designing a project, choosing a species; formally registering legally, applying for funding or a loan, selecting a site; ensuring land use, water, electricity and other land use planning/ approval and an environmental impact assessment/marketing feasibility study, prior to preparing the actual site. A hypothetical aquaculture production, process is summarised in Figure I and a potential international, aquaculture commodity supply chain with various stakeholders is presented in Figure II

**Figure I: Hypothetical Aquaculture Production Process**

**INPUTS** (Stock including hatcheries/Feed// supplies Information, Communication; Skills –Education;

Labour, Capital, Technology)

**PRODUCER/**Production Processes (pond, ranch, tank, aquaponics and cage), fertilising/monitoring

**OUTPUTS** –species maturing and fish husbandry cultivation and harvesting stages, packaging

**STORAGE, PROCESSING**/Value adding;

**MARKETING, TRANSPORT** and distribution even potential customs and exports.

**RETAIL**   **CONSUMER**

**Figure II: A Simple Commercial Aquaculture Supply Chain**

**Import/Export/Transhipment/Transit**

**Resource Extractor/Producer Value adding/beneficiation Port Port authority/customs/state**

**Customer Consumer Retail/ Wholesale Transport and Distribution Shipping**

**Banking/Insurance Marketing/Publicity**

**Aquaculture Industry Stakeholder Requirements**

To establish a potential aquaculture industry in South Africa this review recommends existing and prospective stakeholders including members of professional representative associations are consulted across Figure II’s proposed supply chain from producer to consumer. To avoid under or over-utilisation costs, aquaculture production facilities and intermodal connections need to exist to the extent demanded by these stakeholders. Aquaculture therefore needs to satisfy the following Table 1 stakeholder requirements identified from literature sources including Rouhani and Britz (2007), Rural Fisheries Programme Department of Ichthyology and Fisheries Science Rhodes University (2010) and Guy, McIlgorm and Waterman (2014). It is therefore essential to provide sufficient qualities and quantities of labour, equipment, management, capital, technology, infrastructure and services to satisfy market demand with supply. This is attained by adequately providing a consistent, adequate, profitable and productive service capable of allowing for fluctuations in growth, existing capacity and future projected growth. It needs to be commercially viable at sufficient economies of scale, able to recover fixed and variable costs without external funding. Potential projects also need to satisfy security concerns against hypothetical environmental, public health and other risks. Stakeholders also need to ensure appropriate environments, water supply, land use/property rights and climate, market and transport access along with crime and perceptions by neighbours. This reduces potential complaints and associated costs including the possible suspension/loss of business, fines and other expensive measures that impede business. These measures apply to many businesses/parastatals

Table 5: Aggregated Aquaculture Industry Stakeholder Requirements

|  |  |
| --- | --- |
| **Expectations of an Aquaculture Industry Producer** | **Commercial/Community Expectations** |
| Provide sufficient information | Availability |
| To Consistently update information | Promptness/swiftness of services/infrastructure |
| Security | Allocative/Productive Efficiency |
| Cost Competitive | Functions are modernized as much as possible |
| Productive/Efficient – swift and accurate processing | Direct service/transport connections exist |
| Reliable/frequent functions of sufficient quality | Productive, trained labour responsive to needs |
| Satisfying unusual requests – altering schedules/ flexible to changing circumstances | Sufficient Capacity exists  Efficient – utilises capacity/economies of scale |
| Sufficient quantity of functions exists | Commercially profitable |
| It satisfies marginal caller requirements | Equitable in satisfying the user pays principle |
| It avoids delays/strikes etc | Minimises negative externality/congestion costs |

South Africa has produced a number of guidelines in preparing to convince its populace who has not traditionally favoured this source of agricultural employment, unlike other African/Asian countries, summarising the benefits and costs of various species. One significant factor is the choice of species based on criteria including nutrition, health, biology; market, profitability; quality; breeding, taste and more significantly, its adaptability to aquaculture; which can determine costs, profits and risks. An efficacious aquaculture industry site, in South Africa could incorporate the following successful case

study identified characteristics

* Efficient and Modernised Infrastructure/Services/Equipment as identified in 2.1. This includes reliable electricity, water sourcing, effluent discharging and waste disposal such that surrounding land/soil, water sources; coastal habitats nor inputs are contaminated. Equipment includes chemical fertilisers such as lime fish feeds or nutrients/drugs to aid the nutritional and health requirements of specimens. Certain technology can provide advantages e.g. aerators can improve species oxygen requirements but require sustainable reliable electricity, (uncertain given Eskom’s past record).
* Rail/Road/Port Transport Connections to the economic hinterland – reliable, accurate, swift and efficient.
* Tracking/Security at all stages to mitigate hazards, especially risks identified in Chapter 3.
* Labelling requirements/trademarks/legal permits
* Information –Advanced Warning System/Communication with Customs, Customers, Port Users and other supply chain stakeholders to be able to adjust to unforeseen delays etc at minimal cost
* If appropriate, IT modernisation to secure records/improve monitoring.
* Cost-effective and efficient amid inter-port competitiveness; that is equitable –not violating the user-pays principle.
* Profitable or at least recovers costs, with close market/trade route proximity
* Environmentally Sustainable to condense ecological, social; traffic, noise, light and other potential externality costs.

Another pilot project scheme could target maritime security. This could consider several forms. Single and joint fleet activities could consider maritime warfare/security/law enforcement strategies as practical pilot projects, linking Africa’s navies and vessels. Other projects could focus on unleashing our significant expertise in weaponry, security equipment, technology and computing/cybersecurity, utilising maritime engineering and other students/faculty in partnerships. Existing maritime security risks could be examined. For example, as Africa develops its maritime fleet, it will need to consider developing specialised systems; whether it aims for automation versus crew and maritime cyber risks –including malicious attacks on vessel electronics. Seafarers generally possess limited technological/cybersecurity training –as another area to develop. With only one specialist maritime technology company across Africa; our port, radar, security, navigation, cargo management and other systems remain highly vulnerable. Vessel mobility and limited Internet connectivity lack the same assistance as on shore; if something fails. Electronic experience is often outsourced; crew are often transitory with limited experience; sensitive data is often poorly secured –especially by a virus from an unsuspecting crew member and flashdrive.

A pilot project could include maritime technology/business, (given only one private South African maritime firm exists for the African continent) and to test other areas from fabricating local equipment to watersports to underwater photography to yacht and recreation design. This could aid local procurement processes until others create their own enterprises, in the absence of specific marine value chain corporations/comparatively few enterprises across multiple sectors. Any idea could then be suitably channelled and supported. Antarctic developments, ocean renewable energy/possible underwater mining also represent areas for testing given uncertainty over future externality consequences. Maritime archaeology, conservation and heritage could be applied to existing wrecks, lighthouses etc. Naval architects, marine and ocean engineers need access to existing ports, vessels and infrastructure/superstructure.

A further pilot project scheme could extend to a government shipping corporation/shipyard and docks. This aids cabotage, submarines, cruising, maritime business, logistics, technology and other areas. In the absence of an impressive African maritime fleet, registering vessels and crew members for coastal trade would provide markets and transport for any maritime value chain product/technology/innovation that is commercially viable and sustainable. It could learn from enhancements to seafarer training, maritime education; ocean popular understanding, greater maritime risk managements and improvements to maritime health/psychology/productivity prior to exporting our contributions regionally and globally. This could incentivise other African nations and the private sector, provide practical experience and the chance to benefit from contributions. To achieve cabotage and revise laws; a business would need to consider questions of ownership, port entry, customs, crew origin requirements; registration, administration, finance (including whether to introduce taxes and subsidies), brokering, tax, legal enforcement, construction and repairs, management and control.

South Africa could develop local cruise vessels, floating observatories and resorts given the significant absence of African competitors and submarines to develop marine tourism and exploration. It could benefit from experience in improving security, safety, marine engineering, naval architecture, environmental sustainability, renewable energy and other initiatives. To produce a cruise shipping enterprise, this report re-iterates the findings of a previous authored report: *‘****Cruising and Cruise Ships as Tourism Gateways into African Shores.*’** Vessels, capital, terminal/seaport access, experienced crew, a viable business and marketing model, insurance, fuel supply, well-coordinated route, value chain partnerships, shore excursions, equipment and legal permission provide certain basic requirements. Whether people are afraid or ignorant; embracing options such as submarines; a devoted maritime hospital for health/human factors or sponsoring maritime cultural exhibitions in art, history, architecture/elsewhere and concessions –i.e. promoting culinary cafeterias and cookbooks/competitions to create a more maritime diet, can counter any remaining inhibitions or constraints to a maritime future.

A prototype scheme could establish a maritime finance/insurance model for Africa. Establishing a maritime orientated commercial bank on the model of the Land Bank/Development Bank of Southern Africa –but offering microfinance, maritime insurance and support for maritime innovations, technology, products and businesses beyond just shipping, would provide a source of capital, currently lacking. This could contribute to Africa and globally, given comparatively few banks exist. Perhaps a maritime stock exchange/market places could also be commissioned. South Africa could further extend pilot projects for marine reserves/sanctuaries to ensure ecological resource security but aiding in marine conservation and research. It could target marine contact and communication across species as the precursor to improving marine knowledge but also unorthodox resource monitoring/law enforcement. Pilot schemes could also be devised to test maritime law enforcement initiatives –mobilising existing vessels and population to preserve sovereignty through various psychological and material incentives –aid patriotism/counter poaching etc.

Achieving these would actually aid our continents and stakeholders to innovate as swiftly as possible –direct sourcing. It could show what can be done –if combined with effective marketing/publicity (i.e. partner with Proudly South African/Proudly African) and professionalism. Pilot projects are the simplest means to promote awareness, understanding, innovation, stakeholder coordination, participation and information sharing. These assert that ideas and inspiration will not languish into poorly deserved obscurity or bureaucratic oblivion. They provide tangible symbols of possible choice and hope where currently few or no options exist. Effective maritime field research would consider the impact of stakeholder influences; existing constraints, resources and priorities. It would have to consider the most effective means of endorsing participation/response rates, communication, information sharing and diffusing/networking to achieve research objectives. It needs to operate on the Harm Principle –minimising adverse externality costs/maximising welfare as practically as possible – with minimal impact remaining. This will immeasurably aid support. The concept of field research needs to consider long term horizons, given few do… How will projects change over time/other conditions? Certain experiments will have to be set up for effective monitoring and review, even as individual researchers and students move on.

Globally, limited formal approaches exist for how maritime related research should be conducted outside laboratory conditions –and its influence. Africa needs to really prioritise forethought to avoid the mistakes of others. Determining more field tests incurs greater recovery expense and risk of uncertain impacts but involves the need for fewer laboratories and specialised facilities. Greater awareness of pilot projects/value of maritime research/ocean popular understanding would particularly benefit access to stakeholders/the community to avoid squandering investigator’s efforts. Pilot projects are simpler to involve various stakeholders for feedback as necessary. Certain projects are more flexible than others to set up –provided the basic infrastructure/resources are maintained rather than randomly conducting field research. An assessment might be necessary to justify if field research/new pilot projects are optimal rather than expensively refurbishing existing facilities. For example, for aquaculture it is simple to vary inputs/outputs/processes, species, technology and conditions. Field research should become an essential part of qualifications, developing more local case studies, ideas and experience. This would improve every curriculum are –so that everything is not just shore based! Ocean/coastal environment exposure in which the various values of the maritime realm are revealed would further commit our citizens to appreciate this as more than just a set of resources to exploit! It would provide markets for products and services, acclimatising Africans, beyond our shores.

## CHAPTER 7: CAMPUS FACILITIES, LIFE AND WELFARE

Although most centres for maritime scholarship will be pre-established on existing campuses; this chapter’s purpose is to consider the optimal campus facilities, life and welfare of all students, faculty and residents; essential to making these flourish. The future of Africa’s maritime economy begins with investment in those who make it possible to be as content and productive as reasonable. This chapter’s purpose is to minimise student riots and maximise wellbeing through well designed facilities, societies and opportunities that are applicable across higher education. It seeks to defuse conflicts and tensions as unconstructive so that residents can divert themselves when necessary; to be more committed, focused, passionate, energised, relaxed; curious; creative and contributing. To achieve this; it is essential to have well-designed campus facilities; in addition to a path-breaking curriculum that engages focus and talent; excellent laboratories, faculty, supportive supervisory and other relationships, resources and funding access.

There is more to life than the merely academic. Any specialised maritime education campus should consider the following facilities either utilising existing facilities where possible or ensuring the provision, construction and maintenance of specialised laboratories and actual faculty offices and common room. Lecture theatres need to be well lit, ventilated, climate sensitive, noise insulated; technology accessible with sufficient space and seating/desks. Students, faculty and support staff; each benefit from facilities designed with their requirements in mind. A well-stocked library of specialised and generalised textbooks/books, the most recent journals, CD’S, DVD’S, past exam papers and theses along with periodicals and newspapers and fiction for relaxation. They need provision for sports facilities, societies student centre –possible society/club facilities, administration and student representation; chances for culture including a cinema/theatre; bank/ATM access, hairdresser, bookshop/stationers/printers. They may benefit from at least one general store, a place to host religious services/prayers, halls of residence, recreation areas; permanent, temporary and visiting academic accommodation with security services and administration. It is advised to offer concessions to multiple shops/bars/catering facilities –enabling self-financing Excellent pedestrian access and public transport/taxi facilities –connected to the urban centres, key student suburbs, core tourism attractions/beaches/malls etc and bus/train station/airport directly to aid mobility and accessibility. Interconnecting free shuttles across all campuses in sufficient numbers and frequency to address demand, prevents the pandemonium of students fighting for places/scrambling/missing connections as at UKZN with 1 bus every 2 hours for around 60 students out of thousands.

Student and faculty physical and psychological welfare needs to be taken seriously. Access to healthcare, medical checks, student counselling/Listening Service/religion will more effectively address these, so that candidates are not isolated and gain from attention to health and any concerns raised. The above facilities either need to be provided or within 1-3 kilometres of the vicinity walking distance. It could offer food allotment community gardens/aquaculture –students can learn and share produce. Spacious grounds with greenery, places of peace, shade, lawns to relax, benches and tables; litter free enhance the overall student experience as do designated separate areas for halls of residence quiet study/residence zones in contrast to noisier/livelier social/entertainment/dining centres. Postgraduates/those seeking peaceful domestic environments should be separated –to avoid intrusion. Halls of residence also need to be designed securely, residents only –but with good insulation –sound/heat/climate ventilation, sufficient shelf space, wall sockets and Internet connectivity. Dedicated Residential Support Officers (RSO’s) and student leaders/committees can plan events, ensure clean ups and consider collective/individual wellbeing. If any service including residencies/utilities etc are contracted out, ensure that the clients have university access as an oversight to protect their welfare.

However, information is essential if candidates prefer private sector –about tenancy laws/supportestablishing their rents, security deposits, negotiating contracts, strange laws and other issues. Sufficient halls of residence are necessary –even if under private partnership as concession on university land.If an international or postgraduate –or even inter-state student completely unfamiliar with the local terrain, the last thing many really feel up to, is searching through the private landlord sector? How do they know whether or not they are receiving value for money; what do we do about utilities and bills; what about security, insurance and maintenance –and most urgently of all; what do we do when something goes wrong, are credible fears.Also being close to lectures/study cubicles/the library, having regular social activities/sports provided by the campus, access to the bus service including the airport shuttle directly, included utilities and laundry access can provide further advantagesAt least the campus can provide laws, structure, stability and predictability.

The campus design needs to be ecologically sustainable –to minimise carbon footprints including solar powered and timer pressure activated, sensor lighting. The design should incorporate student/faculty contributions in art/architecture –considering light, sound, aesthetics, culture, history and a maritime theme designed future. Exhibitions, cooking classes/cafe areas, poetry, debates, film production, drama and music… both local compositions but tributes to any maritime themed heritage, future, research discovery/contributions etc could be offered. This adds involvement as does setting up volunteer patrols to clean/enhance the place. Responding promptly to an online electronic maintenance portal can allow campus residents to feel personally involved when reporting maintenance incidents. Security via resident only access could be provided more stringently. Students could sign with security to allow authorisation to the library/computer laboratories and other areas after hours if responsibly managed. Campus residents really need free, comprehensive Internet access socially and academically in this Digital Era –even computer labs and in halls of residence/on grounds; yet updated against cyber-hacking. Campus map guide boards and help intercoms (to security/Accommodation/others) can really aid during problems. They need to feel secure and safe with regular patrols for assistance, cameras and other protection. For those feeling especially vulnerable, patrols could offer to escort them –as at this author’s British university; along with designated Security/RSO contact help phone/channels button activated. Information about all contact points/opportunities could be provided –allowing campus radio/newspapers freedom subject to usual legal issues/centralised electronic newsletters and volunteer staffed formal social media platforms including Facebook, Twitter and WhatsApp.

Careers, Intellectual Property, Funding Sources and Enterprise Hubs, aside from formal university unions, recognises the life beyond the university that students/faculty may be. Dedicated areas could be provided at nominal rent/free for students to market products and services/create start-ups. Each campus ought to have the options of at least one cheap cafeteria/ restaurant –with healthy, nutritious food options; a shop to purchase staples/ basic groceries/ snacks. Providing places to advertise jobs, volunteering opportunities, gap years, funding sources, events, conferences, societies, accommodation rentals, advice and reviews all eases typical pressures during this timeframe. Student Engagement leaders/the unions/the campus can arrange events from fireworks to a formal ball to debates, meals, trips, concerts and performances. In particular, students enjoy trips or experiences of interest involving the unusual –especially those not normally accessible. These can be funded by Student Levies Amenities, concession rents, professional association support, donations and other sources. It is advised to foster campus spirit – appearing at events, supporting teams/performers, voluntary clean up, recycling and charity drives –even involving senior faculty/management. However, students would retain greater loyalty to a campus that allowed them how to vote and allocate certain funding/raise concerns.

The most inspiring of philosophies is that of **Carpe Diem…….** Seize the moment! Seize the day… We only have one life that we are assigned to and when challenged do we really only want to be known for a thesis, the job we do or our offspring, when we can characterise ourselves by our abilities, our achievements, our experiences and our legacies…. As a student from school to university I wasted a ridiculous amount of my life and my youth, convinced that something better was going to happen and that others would plan events and arrange my life to make it fascinating, utterly bored rotten in the meantime… However, I realised that I had to make an effort to become involved. What can the university provide academically, networking, socially, financially, in skills and in opportunity? What chances does the place provide? My undergraduate British university experience worked out brilliantly because it had over 300 student societies among 15000 students, a cinema, theatre, 2 nightclubs, several pubs, cafes and restaurants, its own sports complex, library, 300 acres of woods, a mile to the city centre and transport connections into Europe. My Master’s level involved student protests and riots with burning buildings over fees and student pandemonium in South Africa. In contrast this author’s postgraduate Pacific campus experience was dead –with no societies even debating. It was more basic, believing only in work although it had a cafeteria, a library and laboratories/lecture facilities. After it was suggested; that university turned to mental health activities to counteract the manically depressed and suicidal angst that plague students –especially when exams and pressures of deadlines arise. Squeezing rubber stress balls was promoted to release the tension…. Massages were also encouraged whilst for those more inclined to have faith in non-human animals over humans, the therapeutic, soothing caressing of a dog, a cat… even a lamb were summoned to alleviate stress... Then there is physical exercise –by exerting yourself –the pain and ordeal can singularly drive focus away from whatever assails you at the moment. The opportunities must exist or be created, however…

Students and faculty members seek to enjoy and divert themselves, relative to their interests. This report therefore favours Carpe Diem. Student/campus life should therefore maximise candidate participation chances –extended to all parts of maritime education whether postgraduate or undergraduate, differentially challenged or able, international, culturally diverse, distance, vocational, community member, administrator, faculty, honorary/guest, auxiliary or support staff. This involves effective orientation/information awareness but also leadership and training to maximise the student-customer-stakeholder experience. This isolates many from joining insurrections/unrest, defusing tensions. When any issue is raised; the campus/those involved should pursue impartial arbitration/diplomacy. All parties need to be freely and fairly able to express concerns in a reasonable timeframe, without reprisals and have these issues responded to. Effective communication should pre-empt issues by notifying parties of any issue that might affect them formally. Any events should be effectively notified rather than at last minute out of courtesy –People have lives and respectfully need to adjust with some warning often. These appear common sense but are often marginalised, aggravating issues. Praising achievements as detailed elsewhere could mobilise support further. Trustworthy students could be recruited as Student Ambassadors to market the campus to prospective applicants –offering orientation tours –or aiding recruitment at various places, especially schools.

Societies/Sports and other opportunities are essential for campus life. In particular, these require a space, funding and minimalised bureaucracy/paperwork to operate and freely publicise. Regular society fairs should be hosted termly, based on student demand and to provide information, facilities, advice, support and partial funding, with members of campus especially encouraged to participate. In particular; maritime education across all areas would benefit from establishing societies in Debating, Financial Literacy and Investment Forum, Eco Literacy, Vocational Guidance, Entrepreneurship/Business, sport, dramatics, music and then specialised clubs relating to each maritime academic subject offered –but driven by volunteers. Chess, drama a band/orchestra cater for other talents. Given the isolating experience of postgraduates, international students and faculty in particular; these should receive specific awareness of opportunities, devoted support contacts and dedicated university, campus, school, department and local hosted events. Examples could include film screenings, orientation tours, meals, debates, seminars, trips, and teams –even a society. The university/accommodation services/ individual societies could improve campus life through chartering transport cheaply and arranging not just field trips but general trips/meals etc for experiences –ideal for students/faculty to explore; (yet they can contribute reasonably). Professional associations could also be contacted to see if they wish to arrange local chapters –i.e. engineering, technology, business, law etc –with maritime elements. This especially aids student networking potential and awareness as detailed elsewhere.

Education in a new era will be based on meritocracy –and moreover; on what each person can individually and collectively contribute to the society; nation; environment and world that they find themselves in…. This means that those who seek to become entrepreneurs –can have their creativity encouraged –even in secondary education –the same for those more artistic/ cultural; seeking vocational training; technical; skills; social work and sportsmanship rather than subject all to the strictures of a conventional academic education –which will be granted for those who seek it and deserve it. Throughout though; we will seek the harnessing of humanity’s creative spirits and talent –to reach its ultimate potential and to experience the life of Carpe Diem -a spirit often denying it. University is just as about experiences, memories and characters met as it is about the formal academic experience and campus. Who they meet, what they do, how they live matters… Well designed campus facilities and opportunities prepare for future life.

At the very least these will grant those students who want to participate in university life –a chance; –in addition to specific ones for sports; culture and academic subjects/ religions etc and the Student’s Representative Council –plus possible local political and other organisations. There shall be no restrictions –in the formation of a new society –provided they obey the law. The campus can form devoted partnerships with charities/NGO’s. The armed forces can provide reserves. Local volunteering groups and community projects can seek to recruit via advertisements, visits and devoted fairs/exhibitions to encourage campus residents to integrate more into local conditions. Postal and communication facilities also assist. A Society for Creative Anarchism and Anachronisms –can utilise computer hackers/ programme young wizards –perhaps the only area with a maximum age limit of 30 has 2 purposes. One is to aid the intelligence/ government services/ counter cybernetic espionage. The other is to utilise procreative energies.

“So how can you make a difference? –Actively seek to engage them through surveys evaluating coursework, student, academic and other experiences, devoted Student Engagement Leader volunteers, union/course/residence representatives and offering channels –and implementing suggestions seriously. Students/staff need services respecting confidentiality in which they can air a concern and be assured that it will be attended to by professional advisors. They need awareness of the channels. As stated, it is essential to provide a Listening Service which can include psychologists and volunteers. This has myriad purposes. It serves as a campus individual and community channel and feedback mechanism of constructive criticism –listening to ideas/ harness etc to assess public response –and seek to resolve it where possible. It should aim to assist them with any concern they might have for nothing must impede the health; productivity and prosperity of those who contribute most to the future. This defuses riots/tensions/suicides etc; ensuring greater campus spirit and loyalty to avert the issues that arise when not listened to. It improves psychosis/ psyche/ souls of residents to show they are appreciated. Other ideas suggested included free newspapers, communal meetings/trips; seminars to promote sleep, meditation sessions –even a dog to release pressure. Whether ideas actually materialise… often only if you are persistent and bug them enough, never ceasing so they forget. One idea for which I never heard anything was to provide all PHD students with a free T shirt so that we could recognise each other across faculties and be able to initiate social experiences easier to counter loneliness. Whilst undergraduates and postgraduates may seem different, these immersions in real life, with societies, trips, free film screenings, talks etc. provide a way of knowing people beyond the immediate cubicle, laboratory, hall of residence or lecture theatre neighbours. However, if you invite people and they persist in ignoring opportunity –this can be challenging!

Riots emphasise where policies are actively failing. Improving campus life pre-empts diversions from ensuring maritime education and research actually take place. Considering these derails critics and radicals as unrealistic. If a particular policy or individual/issue is proving confrontational or is raised –it should be seriously investigated to see if it is valid. Chaos benefits only a few anarchists. Providing excellent facilities, societies, autonomous funding sources, charters of rights, channels of support, real power, Student Experience Barometers and teams that actively manage and a Listening Service provide certain concepts for tertiary education authorities. Meditation and conflict resolution skills/counselling should be offered sympathetically –the administration should not be so swift to take the side of an academic. Suppressed students only create unimaginable horrors in unexpected outcomes. To prevent a repetition of the South African student riots, each student and faculty member –full or part time, undergraduate or postgraduate are recommended be entitled to the following elementary, inalienable rights provided they obey the rules of their campus and laws.

**Charter of Fundamental Student Rights**

* Each student has the right to protest and request petition of grievances –to be heard and to have their reasonable protests –addressed –answered, -modified/ rejected or accepted within a specific time period. None should ever feel ignored –each level of faculty; student representative; administrative staff and leadership should have an open door policy –the freedom of access set aside each week.
* Each student has the right to peaceful freedom of speech, airing of protests provided that it does not violate the Harm Principle to another living species –animal or plant and does not damage/ violate university; public or private property.
* They have the right of appeal –even in disciplinary proceedings –and the right to be heard/ can utilise character witnesses/ have witnesses/ advisors etc…
* They have the right to an autonomous student representative council to air grievances or to form their own societies, without hindrance from the university –no limits or minimal number of members and other registration requirements is necessary. The university will provide a free venue to any member for an internal event –and will look favourably upon it for external affiliated events –nominal rate proportional to venue costs –provided it is a faculty or student member and it is non-advertising/ commercial profit seeking but genuinely afflicted with the pursuit of academia/ cultural enrichments or the interests are pertinent to the society sponsoring it.
* They can stand as independent candidates –even the societies will not have to be afflicted with the Student Union/ Representative Council –can be bypassed to contact the university directly
* They have the right to receive formal induction sessions; to receive full information about every aspect of student life –including possible societies to join, as well as given the chance to gain employability skills/ counselling, free medical access etc… Students need formal orientation sessions –to know what is out there –as it can be difficult to find this out on one’s own… -but also to make the most of it. (How else are they supposed to experience every part of education, to maximise that which can prepare them; unless they know what exists out there?)
* They are to have the right to peaceful lectures and examinations –pursuing the right to education without interference by any internal authority; any other student or protester; government or external party that tries to infringe upon this privilege. (After all; not only are they paying customers –they have fought hard for their well-earned privilege to pursue enlightenment and the chance to better themselves –as well as to freely enjoy –what is indisputably for many –one of the highlight periods of their lives)

All students –even foreign are to take a public Vow of Obedience to the University Charter; Code of Conducts and Rules -including those of Student Rights along with an Oath of Allegiance to be held as legally binding –perhaps that way they might actually value their education –if it has the potential to be taken away from them –and the attendant privileges that go with it… They do have the privileges alluded to above –including the freedom to dissent –but not to interfere with the right to education/ enjoy university of other students/ faculty –to engage in violence; criminal activity or destruction of university property –right to peaceful protests/ boycotts; sit ins/ to freely assemble peacefully. Most administrators and faculty forget that in this era –students are consumers –mainly paying for a service. They may have to respect others but in themselves they deserve as much respect as any business would give its clients. Any member of the local police; university –or university security proctors who interferes with these rights –or any student that contravenes them has the right to be subject to a joint student –faculty –management/ Senate tribunal to determine the appropriate punishment. If all parties are represented and treated fairly –it has a higher probability of being reciprocated. Only when students and faculty are provided with the facilities; resources and peaceful; yet culturally enriching and academically conducive environment; could they possibly be expected to attain their own best.

**Student Representative Councils –with real power:**

Commonly; these have served as nothing more than a prestigious –sometimes financially lucrative means of honing one’s curriculum vitae –to make it more impressive to possible employees –and as a means of defusing student attention –where the faculty combined with student apathy have largely turned many into toothless watchdogs –as positions incapable of offering any meaningful threat –but still of some power and authority. However; we would cure student apathy by delegating actual power to them-receive student/ faculty delegations to air grievances/ protests –intelligentsia as potent threat will be averted... Regular interactions between the administration; the faculty and students; will reduce animosity in order so they might focus more on academia. However; those students who continue to disrupt; even after these rights have been granted and privileges extended –disrupting other students; will face the consequences of not valuing their education sufficiently to concentrate on it… Students have to see that issues are actually relevant to them before they have any incentive to participate. They also have to have a functioning means of communication and gaining information about how the SRC is relevant to them. This follows the excellent method of British universities –of active question panels; a website with official email addresses; events well-advertised in advance; tangible support for students; societies and issues; a community radio and newspaper etc. They also need autonomy –to appear not part of the status quo… Students need to be granted positions of power where it is actually effective and possible of influencing major policy decisions –not follow some bureaucratic hierarchy. Therefore, this report proposes reforming campus life, adding student tribunes (social, academic, hall of residence, year, other categories) to represent their interests in University/ Academic Senates

## CHAPTER 8: Student Recruitment

Given the devastating consequences of a poor investment; those who will serve in Africa’s maritime economy education future first need to be professionally trained and recruited. This chapter briefly outlines potential means for maritime education providers to recruit students more effectively. This applies to primary, secondary, tertiary/undergraduate, Postgraduate, professional, vocational and community levels. To ensure the optimal student enlistment process, it endorses a centralised application system based on the British UCAS system. This would connect all maritime education, research and training providers; with a centralised research funding and scholarship database. Students could choose up to 5 places in order of preference, uploading their CV’s, personal details and motivation letters once rather than multiple times. It provides a filtered, far more automated and efficient processing system –verifying records against SAQA/other qualifications/professional associations etc. This could link funding with accommodation with academic positions to assist students, faculty, service providers and sponsors, aiming to avoid the chaos of physical enrolment and multiple paper applications. IT access could be arranged/open day help sessions; or via the various Ambassadors when visiting campuses. Alternatively postal and physical applications could be accepted but receive lower priority as an inducement for more to select the online option.

This website would publicise key barometers including relevant links; application progress status, number of places fulfilled/left and deadlines. The aim is to simplify this process, enticing sufficient students are recruited of a suitable quality within a reasonable time and avoiding the tensions of a surge of last minute applications/tumultuous flux. For this to work; the application system; education providers, funding, campus life and other opportunities must be publicised to recruit students from all sources. This includes traditional recruitment techniques including printed leaflets, campus tours and Open Days, newspaper and magazine advertisements and maritime careers awareness campaigns. It includes targeting radio, television and connecting to social media platforms/tools including Facebook, Twitter and WhatsApp. It includes visiting existing university, college and high school campuses/local community facilities via volunteers to publicise this. Professional associations, chambers of commerce, core marine value chain stakeholders and IAMU/IAML/other maritime education representatives could all be targeted to attract international applicants.

This message could espouse many things from the quality of campus life and facilities; to the excellence of research and qualifications; to future employment prospects, to the chance to pioneer Africa’s maritime destiny, to curiosity, to the dedication of the individual –the field is open to talent, will, interest, effort, inspiration and hope! It could emphasise the commitment to the candidate’s personal health and success unlike so many other global and local providers who appear to have little or no interest. It could emphasise future connections, vocation pathways, core traits, skills and qualifications necessary to prevail. It could emphasise ocean popular understanding and Operation Phakisa/AIMS so students can reliably determine if they wish to embark on this maritime odyssey. In this era, the future of maritime education and its campuses are no longer merely served by just students of sufficient all round, academic grades. Therefore, to make Operation Phakisa work; specific marketing could target Entrepreneurs, Creative, Scientific, Cultural, Sport; those Curious, those Inspired; those Theoretical and pure academics –and those more pragmatically just looking for a job in the maritime economy!

In the application process, each could be asked why this wish to participate/enrol in this campus, this course, this future? Where do they see their future and why? What are their qualifications and interests? What do they expect from the student experience and the provider? Would they be willing to participate in campus life, societies, volunteering, teaching, research etc? How would they improve things? What do they consider the future of their area to be? What would they be interested in contributing to AIMS/Operation Phakisa…? How aware are they of these and other maritime policies? What are their fears? Their CV’s and individual campus motivation covering letters could be uploaded and attached. This helps to filter out those lacking interest/commitment; unable or unqualified/idealess –those who simply vacuously turn up to a tutorial or lecture theatre where the academic tries to coax some flicker of life, thought or effort often futile, who fail first year in which resources are wasted from the more deserving.

For many providers, student recruitment is merely conducted as just an administrative necessity rather than a source of opportunities Information filtering through student recruitment and applications can benefit maritime education in multiple ways. It sifts students into more effective utilisation of their efforts, experience, talents and qualifications. Those with ideas can receive the most suitable support/funding/location/resources to aid them and their host institution. Ignoring untapped human/intellectual capital is counterproductive, even where it appears to save time/resources initially. Postgraduates and International African Students in particular are worth perusing, given scarce existing skills, experience and institutional capacity. Fully utilised postgraduates can really aid student recruitment and pay off in gratitude, appreciation, loyalty and production output/contributions. Checking social networks as a filtering algorithm/past backgrounds can reduce malarkey/potential strife seekers. Additionally, retaining those on record aids with establishing a networking base –to connect future students for research/employment etc. Today’s student could be tomorrow’s sovereign, President, Minister of Finance or generous alumni head of a multinational corporation. Africa’s existing education sector have highly marginalised the student experience failing to exploit the American model of endowments and patronage from loyalist alumni, to enrich campuses. It also simplifies future faculty recruitment, exchanges; seeking specific funding applications, postgraduate applications and disciplinary concerns, if necessary –avoiding repetition.

The most potent catalysts for recruitment and support are people via Reputation! This is why ensuring a productive campus life, experience and research journey is highly emphasised in this evaluation and formation of maritime education. Those who experience excellent relationships, connections, chances, resources, teaching, research and interactive experiences are more likely to publicise voluntarily. This minimises resources that providers need to devote to marketing. Encouraging hopes, dreams, employment, Carpe Diem and actually listening will guarantee higher quality applicants and sufficient numbers relative to places offered. It will be further filtered by any favourable impression by any visiting prospective student, professional, public and academic. The Student Experience Barometer, campus visits and ambassadors could reinforce this concept that feedback is utilised and concerns taken seriously. Those responsible could target recruitment across SADCC and Africa –partnering with their government education ministries and schools to allocate a certain proportion of places to aid maritime education capacity building regionally. Sources across shipping, professional communities and company supply chains could ensure vocational training recruits.

Creating specific maritime high schools beyond South Africa’s starting three could benefit from first priority in student recruitment. This ensures those genuinely interested and aware, deserve preference for their persistence. Maritime themes could focus normal subjects from history to art, science, technology, mathematics, marine biology, oceanography, climate change and maritime business/studies. These could filter students over a longer timeframe than merely recruiting at tertiary level. Determining course requirements and standards for selection, further ensures the more valuable candidates receive places. Entrance exams, tests and interviews could screen further. Specific funding could target topics in emergent research areas and scarce skills to specifically attract postgraduate student recruitment with Operation Phakisa and stakeholder priorities. It helps to target those who admit some willingness/awareness/affinity/interest in the maritime sector over opportunists. This report cautions against utilising third party agents as generally an unnecessary expense/loss of control for marketing. Providing free laptops/items/simple credit and other complementary items does not attract the most convincing of adherents. Reputation, efforts and results should be more than enough. Pointing out the deficits of other education/employment options may also work.

## CHAPTER 9: INFORMATION AND COMMUNICATION STRATEGIES FOR MARITIME EDUCATION AND SCHOLARSHIP

Currently Operation Phakisa has yet to comprehensively emerge from its founders’ dreams because many stakeholders are not entirely aware of all that it might offer. Operation Phakisa can only arise if its stakeholders are enlightened as to what its objectives and achievements actually are. Nothing can be effective without access to information. These stakeholders remain unaware of sources of local, African and global maritime education options. They do not fully benefit from maritime scholarship and research; pilot projects and awareness of initiatives. This chapter proposes that if they are to participate in maritime education and an ocean economy; from aquaculture to Durban’s proposed seaport and inland cargo hub; that more effective information and communication strategies are developed. Those implementing Operation Phakisa should target psychology/economics along with IT literacy, effective speaking, reading, listening and writing. Information needs to address stakeholder requirements. It needs to be accessible, updated, relevant, valid and anything commercial –what they are able and willing to pay for. The following efforts once coordinated provide a start to the reforms needed for participation, loyalty and support.

**RECOMMENDATIONS**

* Opinion Polls could determine if people have sufficient information and could be invited to ascertain awareness of Africa and the maritime sector.
* An integrated contact directory of all marine economy/professional association stakeholders to facilitate communication
* A centralised directory of maritime education providers, courses, qualifications and contact details
* A centralised application system for education, accommodation and funding
* Updating the Department of Transport/Operation Phakisa website to cross-index all maritime related legislation, policies, research, results, news and achievements frequently
* Creating social media channels –Facebook, Twitter, What’s App?
* A centralised careers/job search website.
* Links on other previous networks, professional associations, universities, funders… and connections to other areas from aquaculture to climate change to engineering to tourism.
* Utilising Student Recruitment tools (Chapter 8)
* Education awareness –integrating into the existing curriculum or introducing maritime studies, in maritime themed areas with online access to registered students/copies of past papers to facilitate academic/personal development.
* Recordings/copies of existing presentations, journal publications and lectures plus podcasts of seminars so that messages are not just once off.
* Conventional media –television, print, websites
* Maritime scholarships, prizes and competitions
* Public debates over issues relating to Operation Phakisa/maritime policy issues/projects
* Reviews of the navy –simulation exercises; merchant fleet, cruise vessels, other vessels, yachting and recreational vessel regattas. Any registered vessel across South Africa/Africa can take part to show our physical ocean presence, sovereignty and shipping register.
* Social media/physical occasions to discuss/publicise research achievements.
* A maritime encyclopaedia –covering South Africa/Africa and the maritime sector –past and Operation Phakisa
* Devoted books –marine ecology, coast, history, future etc
* Holograms/models
* Monuments to commemorate maritime heritage and achievements –Halls of Distinguished Alumni, Maritime Heroes, Noted Maritime Projects and Achievements
* Open Days/tours

This chapter’s point is to ensure whatever information, discoveries and innovation Operation Phakisa has developed are cost effectively, swiftly and efficiently distributed to any key stakeholder who might benefit. Any achievement needs to be securely backed up and stored – (Electronically in Clouds/physically in climate resilient underground stores i.e. old mine shafts/caverns). It needs secure digital encryption avoiding cyber-hacker file corruptions. Exemplary records are advised to be mandatory for any –whether administrator, staff or student so that it is swiftly accessible in the future. Recording experience provides future benefits even the most eccentric fragments of thoughts as one. The challenge with information is to determine its value -Should it be freely accessible or operate under the User Pays Principle –commercially available? This often is conditional upon the funder/host institution. However, the right to access information should belong to the originator. Anything that is personally of benefit rather than externality costs/benefits should be paid for –especially if they can profit from it/use it. It can never foresee what might be useful in the future. Stakeholders may feel overwhelmed with so much information. Information needs indexing/cross references. Given the irrelevance and limited nature of ordinary Internet search engines, an effective index would enable them to prioritise. However, stakeholders and facilities need access to top journals, media, books, DVD’s and CD’s to complement information.

This chapter’s intention is familiarisation, greater appreciation and popular understanding of our oceans and achievements for African citizens with the virtually unknown maritime sector, Operation Phakisa. It aims to recruit anyone interested from abroad. It would commission music, art, drama, documentaries of projects/people/findings and themed films –even a devoted channel along with existing channels. Evocative music and visual imagery can accompany these along with well compiled research/achievements concise summaries. The more people feel personally clear and informed the more willing they are able to utilise the information and gain support. Channels could be set up for maritime issues/implications –Currently stakeholders remain unaware in reporting a specific issue. Maritime Law Enforcement liaisons/reserves could be formed so that any reporting a concern can be reassured sympathetically the issue will be resolved.

For Operation Phakisa, maritime scholarship and an economy to be formed, silence is not golden. To succeed requires maximum publicity, when not adhering to commercial, legal and other necessary reasons for confidentiality. Our citizens will have to feel that they can become a part of it. They must know how, where, when and why along with which parts will personally apply and appeal to them. For example, one approach is to promote franchising products not just tourist souvenirs but branded T Shirts/clothing, toys, crockery/cutlery, models, art, sports/recreational equipment and ready seafood meals. Specific projects, vessels, people, discoveries, experiences, local marine ecology, history, culture, oceanography and others could be celebrated. This also can be marketed to other African nations and remind visitors that Africa contributes to the world. This could provide further funding resources for a coordinating maritime economy/education centre and individual campuses/projects. The more involved they are, the more free publicity they will provide and the greater the return on any research/achievement investment. It installs greater patriotism and dedication towards making a maritime heritage real.

For effective communication and information to occur, maritime education must link to the maritime economy and participants. Hope, Dreams, Pride, Faith and Civic Patriotism, Creativity and Curiosity can be pursued. Any emotional, physical or other resource that helps, is worth pursuing. Communication/information also needs to consider timing. –The full impact may mute if something more contentious/momentous is released simultaneously. They need to be wary of incremental introductions. They need to counter boredom, fatigue, excess information and inertia. However, fear/shame and other means are suitable for projected maritime risks and uncertainty. However, it could gain political support at other times, in addition to community, business, media and academia if presented as an answer, a diversion, a symbol of hope… Effective communication can provide a maritime path to land orientated citizens. Creating story sessions can link seafarers, naval personnel, fishermen, cruise tourists, maritime recreational adventurers and others to share their encounters with those ashore. Information can be further communicated through joint newsletters and email mailing lists. Research could consider how to filter emails, process phone calls and attract people’s attention. However, stakeholders themselves would be personally encouraged to participate –not just those producing but those consuming and experiencing…

This chapter proposes decentralisation –encouraging people to take the responsibility/upload their maritime content themselves where applicable. They can be endorsed through formal and informal networks, and encouraged to pay attention. Staff/students can personally develop a centralised source of research/experience profiles with uploaded CV’s and links to research output. This can aid further networking for research, professionally and employment. However effective communication strategies for all parties could benefit from specific courses/training. They could consider what information is necessary, how, when and why along with which information can be retained, omitted and linked to. Simplicity, Presentation, Appearance, Background, Behaviour, Format, Relevance, Humour; high resolution graphics and actually listening; conciseness, motivation and personal connections are just a few techniques. Tools of effective communication will need to consider information, retrieval, storage, classifying/indexing and cross-indexing, centralisation, coordination, integration, security, accessibility and frequent updating. It needs to mobilise stakeholders to volunteer their own information and become involved. Cooperative stakeholders could receive privileged information/stakeholder contact access. Information does not benefit any, if no one knows about it. Electrifying this atmosphere of trust, collaboration and mutual benefit will further achieve this. Unlike other maritime universities; effective information, research and discoveries will no longer be suppressed, ignored or underutilised. Those who achieve will be honoured, rewarded, valued and used. This report will avoid the silo mentality of developing maritime education, research and an economy in isolation where researcher and students determine and apply only directly related information. It avoids the current problems where only a few actually understand what Operation Phakisa and AIMS can personally mean for them.

## CHAPTER 10: SCHOLARSHIPS, PRIZES AND COMPETITIONS

Anything which advances a student, faculty member or participant’s potential; enhances the reputation and prospects of the host institution. Globally the majority of education and employers proclaim this –but when it comes to actually helping people to develop themselves… the poor soul is often floundering or expected to do so alone/with minimal support and guidance. If Operation Phakisa is to become a reality; this chapter proposes maritime education should maximise opportunities. It outlines how we as Africans can effectively apply for the scholarships and research funding in Chapter 4. It details existing maritime/other connected prizes and competitions that SAIMI/a centralised maritime education system/website/institute could endorse. It recommends further prizes and competitions that could be initiated to ensure maritime education, research and economic innovation materialise among Africans.

Maritime education and research is not merely about grades, results and a qualification. Other chances exist –and Africa has comparatively few winners compared to the world! The prime motivation should be that of ambition, hope and self-interest. These prizes can serve as physical symbols of progress not just actual effort but true motivation and perseverance –indicated on a CV to improve employability skills. By focusing and preparing candidates on what it takes to succeed, they can succeed. A host campus, administration and supervisors/staff/IT and other resources should convince candidates to apply for any scholarship, research funding, prize and competition they can. They should offer commiseration for failure and reward success. Candidates with existing projects, concepts or ideas that might be suitable, should also apply. Therefore, awareness of opportunities and application deadlines are pivotal –internally circulated on mailing lists/newsletters/website links and forwarded by various mechanisms. Candidates frequently need supporting advice/references/assistance in fund distribution/supporting motivation, testimonials and copies of qualifications –Their institutions should swiftly and efficiently prioritise this.

Certain scholarships/funding sources are academic/research/skills orientated. Others reward culture/sport and other talent. Still more reflect travel/conference grants. Socially, an increasing number favour entrepreneurship –as venture capital and other forms of support to any with an idea that can be commercialised as a business/technology etc. Although comparatively few are maritime specific to Chapter 2’s curriculum and Operation Phakisa source; –even generic sources can have maritime applications. There is a high opportunity cost to each application however –requiring significant patience, time and determination. So only candidates who realistically have a chance are encouraged to make the effort, sparing the pangs of rejection and humiliation. Effective student recruitment, information and communication strategies can counter this to a point, with peers to offer support/advice/chances.

As a candidate winner of several scholarships, to learn from those who triumphed over those who faltered; this author notes the most essential criteria to consider in applying for any of these chances. Above all; there is no scope for modesty –the candidate has to believe in vigorous self-promotion. They have to concentrate on scanning opportunities; developing core skills/education, prioritise networking with sympathetic references, manage a well-drafted CV and avoid social networking irreversible gaffes that appear unprofessional. Certain sources generally ask for initial contact/support from the host institution. Personal relevance –on assisting them to achieve their objectives –is paramount –even reminding them, quoting/paraphrasing their polices/aims. The most significant scholarships invariably seek specific answers as deviations on the following question themes. I.e. this report proposes applicants receive guidance on how to think/structure their answers most eloquently and effectively. Conciseness, impersonal, unemotive language, logical coherent sentences and presentation professionally proof read for grammar, style and spelling are cautioned. The basic structure includes a CV/personal details, often reference details, personal motivation letter; an outline of the specific research proposal/idea etc and motivation.

Scholarship questions can focus on professional qualifications, work experience, community engagement, extra interests and activities. Many follow the Endeavour scholarship example –frequently specifying word limits to ensure conciseness, given numerous applications. They include variants on the following: *Please summarise, in words that can be understood by a person outside your field, what your proposed idea/project etc is intended to achieve, why you would like to undertake the proposed concept and how it is related to your prior experience and/or future career goals.* Key research questions/methods/objectives and references are frequently required to be summarised. *Please also provide details, including proposed dates and locations, of any proposed fieldwork and/or internships.* They seek details over past publications, funding sources, awards, prizes, scholarships and professional societies/networks, to filter candidates further. They generally wish to determine what your future intentions are; how this funding will achieve your outcomes and how it can be of benefit/make a difference to the provider/their country/objectives…

*E.g. Please provide details of your proposed programme including how it will contribute to the achievement of your personal goals and further your academic and/or professional career*

*Please provide details of how your proposed programme will benefit us/ and your potential to foster ongoing collaboration and cooperation with your home and host country/region*

Existing scholarships sources were summarised in Chapter 3. The following offer specific maritime competitions, prizes and scholarships

* **Annual International Maritime Law Moot Competition**
* **ERA-NET Cofund MarTERA (**Europe-AfricaMaritime technology)
* **Fish 2.0: Prizes/travel awards**
* **F Suykens Prize for Port Studies** (Expensive in requiring 3 physical copies posted to Europe)
* **Horizon 2020 –**Europe-Africa maritime research innovation and technology.
* **IMarEST Student Bursaries**
* **International Roboboat Competition**
* **Lloyds Global Freight Awards, Risk; Lloyds’s List South Asia, Middle East and Africa Awards**
* **Maritime RobotX Challenge**
* **RINA Innovation Awards –**marine engineering/naval architecture
* **X Prizes:** Shell Prize for Ocean Exploration; Africa Energy, Power Skills, Personal Health, Off-Grid Energy, Cybersecurity, AI, Creating Water From Thin Air
* **World Maritime Technology Congress, Student Design Competition**
* **World Ocean Summit**

Specific aquaculture opportunities under the World Aquaculture Initiative include:

* **International Foundation for Science: Offers small grants for Aquaculture and Fisheries for young researchers in developing countries**
* **ANAF Aquaculture Network for Africa**
* **Africa Economic Outlook**
* **African Geo Information Research Network GIS Portal Streamlines Aquaculture and Fisheries in Africa**
* **International Network for the Availability of Scientific Publications INASP.**
* **AfricaBio**
* **ASARECA Association for Strengthening Agricultural Research in Eastern and Central Africa**
* **Caast-Net - Network for the Coordination and Advancement of Sub-Saharan Africa-EU Science and Technology Cooperation**
* **FARA - Forum for Agricultural Research in Africa**
* **Food Africa - Improving food systems in sub-Saharan Africa**
* **FoodNet**
* **United Nations University, Institute of Natural Resources Africa**
* **JICA Technical Co-operation Project Site**
* **MarineCultures**
* **ReCoMaP is an EC funded Indian Ocean Coastal Management**
* **SANBIO Southern African Network for Biosciences**
* **Science Development Networking Site**
* **Seaweed Africa**
* **Seafood Excellence Awards**
* **SEAT (Sustaining Ethical Aquaculture Trade):**
* **WIOMSA - Western Indian Ocean Marine Science Association**
* **World Bank Fisheries and Aquaculture**
* **United Nations Dept for Economic and Social Affairs, Division for Sustainable Development**
* **Water Footprint Network** – water security

The following present non-maritime opportunities with potential maritime related opportunities

* **African Access National Business Awards**
* **African Affairs: The Stephen Ellis Prize for the Most Innovative Article**
* **Africa Diaspora Marketplace, https://www.thinkable.org/competitions**
* **Africa Entrepreneurship Award**
* **Business Launchpad Competition (**South Africa)
* **EDCTP –**maritime medicine
* **Emerald African, Management Research Fund Award**
* **Eureka Call for Network Projects on Advanced Manufacturing**
* **European Development Days, Young Leaders Programme**
* **Global Innovation Fund –**Community poverty project related
* **ICX Industry Connection Prizes**
* **IPCC Scholarship Programme**
* **M-ERA.NET-**Energy/Materials related concepts
* **Metropolitan Oliver Empowerment Awards (MOEA)**
* **OECD Research Fellowship**
* **Open Up Challenge –**The future of small business banking -maritime
* **Opportunitesforafricans.com**
* **SARNISSA** offer a photography completion for aquaculture projects
* **South Africa-European Research Council Agreement**
* **Three Minute Thesis:** Although not applied in Africa –PHD students have 3 minutes to summarise and defend their thesis
* **Tony Elumelu Foundation Global Entrepreneurship Programme and Forum**
* **UNDP Youth Portal Open Innovation Challenge**
* **UNESCO Prizes**
* **UNFCCC Global Video Competition for Young Change Agents** (Climate Change)
* **Wings of Excellence St Gallen Symposium:** Essay competition -100 Future Leaders of Tomorrow are selected from those offering the best response to global problems
* **UNOGOZI Institute Leadership Essay Competition for Young Africans**
* **World Ocean Summit**
* **Young Africans Leadership Initiative**

Globally; astoundingly few maritime specific opportunities exist in the key research areas identified in Chapter 2. As an inducement; this report submits that suitable host institutions/government/businesses/ professional associations initiate specific prizes, scholarships and competitions. Academically it proposes commendations to the top 3 performing students per class/subject per year. It proposes maritime sports/cultural awards/scholarships. It proposes publishing incentives, conference support grants and field research/travel funding/specific laboratory-specialised equipment funding. It proposes prizes for teaching (Student voted), learning, supervising volunteering and community outreach; employability; commercial successes/technology, product and process innovation. It proposes prizes/competition for research, discoveries, service; contributions and radical solutions to urgent/valuable problems. Specific prizes could reward innovative businesses, government, community members, organisations and individuals for their contribution to the maritime sector, scholarship, policy issues and Operation Phakisa/AIMS. These could include African projects. Singapore have maritime economies and studies prizes to attract high school students whilst the USA offers marine science, pollution and oceanography contests. It organises the Blue Ocean Entrepreneurship Competition to motivate these students. Singapore’s MPA’ offer the following prizes to extend marine value chain and economic participation. International Maritime Centre (IMC) Award, Excellence in Manpower Training and Development Award, Outstanding Maritime R&D and Technology Award, SRS Ship Owner of the Year Award, Bunker Award, Maritime Service Provider Award, Offshore & Marine Engineering Award. South Africa/Africa could produce popular quiz shows, essays and contests along with other prizes to hearten public participation and ocean awareness/support.

## CHAPTER 11: NETWORKING, STAKEHOLDER CONTACTS AND ALUMNI

One fundamental axiom callously inflicted upon me by the Fates, peers, my family and life, was not taught in any classroom –it’s not always about what you know but who you know that really counts. This applies if you wish to succeed anywhere in life. To progress whether in education, a job or reality, it is pivotal to connect with others –especially those who can or potentially might make things happen. This occurs for those wishing to establish Operation Phakisa, maritime education and a maritime economy as well as those aiming to be a part of this. For an African maritime future to prosper; its campuses need to equip stakeholders with whatever it takes to network. Those with ideas, achievements, experience, dreams, scarce talents and potential need to connect to those with resources. In a basic market transaction: Supply = Demand –or needs to. This chapter outlines key networking techniques, stakeholder contacts and the need for any maritime coordinating centre to establish excellent alumni connections.

The necessity of networking is paramount –just consider the failures! For every problem –there is a solution –and invariably someone who can provide it. The only way to achieve the seemingly impossible –is to believe it is possible. This applies to people. Multiple techniques exist on how to influence and connect to people. This author has previously indicated this as core employability skills, essential for African maritime and general education at South African campuses. However, globally it is poorly understood and taught by traditional academics. It isn’t recognised as a vital research skill, omitted from formal qualifications. -Yet try getting anywhere without some personal connection –whether bureaucracy, education, funding, employment or research. When others refuse to cooperate, generally there is someone, even if superior or elsewhere that can provide some help.

Whilst the more successful academics have long recognised the necessity of establishing contacts among peers, at least informally and informally as indispensable for publication in journals, being nominated for tenure, coveted funding or prestigious awards and accolades, many supervisors do not. Lacking formal understanding and instruction, they do not pass it on to their candidates. Many students are supposed to detonate this social minefield themselves, which their scholarly, research training often fails to prepare them. More significantly, where researchers struggle to capture the attention of diffident or sceptical stakeholders as participants, information or funding resources, knowing how to network, who and why and mean the difference between getting your degree and the necessary project results and complete disaster… Fortunately as an undergraduate, postgraduate and at high school, I participated in at least 10 years of formal public speaking and debating. My European university had over 300 registered societies along with many social venues as chances to practise communication beyond my lectures and seminars, even when not the most charismatic. This skill is highly recommended. This is why a formal debating society is proposed for every maritime campus.

The elements of successful networking can vary on the individual, environment, situation, time, topic, resources and so on; however there are several elements which this guide proposes for those that wish to succeed as a student, in modern academia and beyond. Always make a point of interacting with people; whenever the chance presents itself –to maximise serendipity. One never knows when a contact may become useful –at conferences, lectures, seminars, public event, transport and wherever. I persuaded my university to print and pay for business cards. I forwarded my CV and motivation covering emails introducing myself so opportunities favoured me rather than the silent, lazy or uncommitted… Dale Carnegie’s book: “*How to Win Friends and Influence People,’* published in the 1930’s or Sean Covey’s 7 Habits of Highly Effective Teens,’ still remain valid. There are several questions to raise to initiate conversation once you have breached trivia of greetings and asking them about their research/studies (for those implementing a thesis, being reminded of such glacial progress with little to updates, can be unnerving). If nothing else one can always sympathise over adverse living conditions, limited funding and the latest frustration with bureaucrats, supervisors, faculty and other students. One can always forward research or issues they might be interested.

Establish a relationship first –then only ask favours and pressurise. Enquire about their interests –academic, professional, personal and elsewhere. Mention your own –establish interest in that which can connect to your own –or which might interest you currently or some point –see other points in common. Using common experiences to relate –all these techniques forge networking… Certain maritime networking contacts are summarised in Figure V but extend to any professional association, funding source, maritime education provider and other contact identified in this report. If nothing else you can ask others about what they want from their campus, job, research, project, degree... One could ask them what are they interested in about life, what do they think about current affairs, what are their dreams, ambitions, hopes and fears? One could ask them for advice in an area they feel comparatively confident about –or at least their perspective. Sometimes making notes of anything you know about them and occasionally bringing it can either achieve success socially –or at least convey it. If you could solve any problem/ wish for anything what would it be and why? Additionally it is curious that many people always seek empathy and support from fellow students, complaining of problems, pressures, tragedies, stress, disaster and other things going wrong. Simple sympathy/empathy and a willingness to listen can help immeasurably…

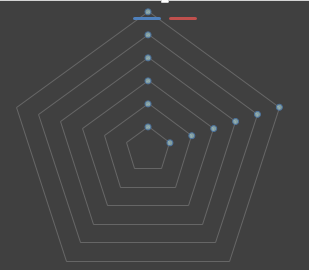
Figure V: South African/African Maritime Industry Stakeholders

ACADEMIC GOVERNMENT

* University of KwaZulu-Natal Durban, Cape Town, Port Elizabeth/other Municipalities
* Nelson Mandela Metropolitan University (KZN) Department of Agricultural and Environmental Affairs
* Transnet School of Ports/SA Maritime School and Transport College KZN DEDT, KZN DOT, SARS
* University of Western Cape/ Durban University of Technology, South African National Department of Transport,
* Tourism/Business/Logistics schools, colleges and universities Public Enterprises, Public Works, DHET, DEAT, KZN Tourism, East Cape Tourism, DTI, Economic Development

PORT AUTHORITY/PARASTATAL

* National Ports Regulator Authority of South Africa.
* TNPA (Transnet National Port Authority)
* Transnet Port Terminals/Transnet Freight Rail, Sanral, PRASA,
* Other Governments, African Union,
* Indian Ocean Observatory, SA Weather Service

 IMO

* Greenpeace Africa, Fish SA ILO
* communities, conservation agencies,

PRIVATE SECTOR PROFESSIONAL ASSOCIATIONS/

* APL Logistics/APM-Maersk Ethekwini Maritime Cluster,
* Bidfreight Port Operations Durban Chamber of Commerce/ Durban Port Development Company
* CMA-CGM Shipping, Cosren Shipping Island View/Maydon Wharf Leaseholder Association
* Elgin Brown, Hamer and Dorbyl Shipyard Road Haulage Association,
* Engen/SAPREF/Total Oil Refinery SAMSA, SAASOA, SAAFF, SA Shipper’s Council
* Evergreen Shipping TIPS, TIKZN, TETA;
* FPT Logistics Cruise India Ocean Association, PMAESA,
* Grindrod, Hamburg Süd SATSA, ASATA; RETOSA, SATOUR
* Hapag Lloyd COSATU, SATAWU
* K Line, Mediterranean Shipping Company NASASA: National Association of Stevedoring Associations of South Africa
* MERSETA, MOL Seafarer’s Employment Organisation;
* Point/Royal Yacht Club and members Transport and Logistics Employers’ Association TLEA
* Southern African Shipyards, Turner Shipping Agency Warehousing and Distribution Employer’s Association (WDEA),

Use attention recall –short term memory… In a world which involves juggling multiple factors, to grab attention, it is best to make an impression on your target source whilst networking –so not to be forgotten. Immediately – as close as practically possible after the interaction or event has taken place, is the best time to send a brief communication to their contact details. -Introducing yourself once more, retouching or refreshing their memories of the scenario/ issues raised etc an providing a CV as a snapshot, asking their advice and to be considered in the future for any further contacts/opportunities/ events etc which might be of use/value…Asking them about their own interest/ research again helps solidify this connection. However, another means of initiating a connection socially is to ask them: what they feel is going right in their lives, what are they enjoying about the research/university experience/ local area/ country and what motivates/keeps them going in their lives, so that you can reinforce it…? If nothing else, this can be distracting from their own turmoil. Sometimes that is all that it takes for a connection to grow. Too little appreciation is often felt when things are going well, too little thought and gratitude occurs to sustain us when we actually move beyond the dross of our existence. But it can be preferable to think of anything else that can extend the connection if possible, for those who wish to define themselves as people not by their professions. If the person is not of direct relevance it can still be worth the time investment in the long run, because the moment may be in the future.

The advice I gave in an Employability Skills lecture to a class of prospective, African maritime industry graduates and to my fellow university students was that it is worth retaining somewhere. (Even if electronic or paper form,) continuously updated directories of not just those you like and get on well with but even those whom contact was more remote or passive. Equally important, be careful not to alienate those outside people you truly do not get on with. You never know whether the slumbering person in the last row or the bothering person who persistently asks you for stationary, a copy of notes or some other minor favour, might just end up the CEO’ or venture capitalist, founder of a top Dow Jones 500, corporation; the dean or even vice chancellor of your future university; a cabinet minister or even sovereign of a country… You never know who you might need in the future. It could some bureaucrat that has the power to make your life extremely miserable or bright to propel your destiny.

Therefore, it pays to be charming, courteous and efficient –even politeness and basic respect can go far. This should be emphasised for any student, faculty, staff or stakeholder that comes into contact with Operation Phakisa –and it keeps a more productive peace. Effective techniques may require learning small talk, how to listen and empathise –or at least appear to. In time, its reciprocation could help –whether in funding, learning, moving research onwards employment, awareness of conferences, forwarding an application; knowing about opportunities, travelling or meeting other links… One is more able to succeed –if they make an impression and manage to retain it… To do this –people need to appear willing and interested to be personally involved with the other party. ‘How can you be of personal assistance –and introducing yourself –certainly in advance of any request unless it cannot be otherwise. People will be more inclined to grant you your aim, the longer the relationship develops. From experience, forming potential connections in the right places (from security to secretaries to Deputy Vice Chancellor to counselling services) months –even years before has aided everything from being offered employment and scholarships denied others to travel upgrades to saving oneself among political/bureaucratic chaos and hostile academics.

The personal touch may be time consuming but is preferable to impersonal social networking –inviting ‘friends,’ on Facebook is not the same. However social media can simplify the challenge –but data remains out of your control –to hacking and a permanent electronic presence. Even for emails, we have more influence to select access and preferences. Networking provides more options for free will –not every contact needs to be used –but it can save tremendous time, effort and resources if required. Forming networks or trying these techniques also provides other enriching experiences. If they fail to reciprocate –then you know not to bother wasting your effort too much in the future. It provides great insight into the characters of those you try to contact…

Finally, developing alumni contacts provides even greater networking opportunities for the maritime education sector. Across Africa and existing South African education, institutions this has been atrociously developed. The core aim is to ensure those who go on to achieve some success can benefit others, beyond themselves. It is essential to retain their details, establishing updated information and communication, with newsletters, mailing lists, Alumni magazines, reunions, events and achievements celebrated. Donations and other forms of support will drive hosts of Operation Phakisa further. It can provide a source of further funding, bequests, endowments and other benefits. Mentoring partnerships could be cultivated, potential employment, project and research contract chances offered; accomplishments and reputation freely publicised via Alumni Ambassadors, student and faculty recruitment simplified and access to other key contacts/opportunities strengthened. It could provide guest lecturers and motivational speakers. It could provide political/legal protection, community; data and facility access and other unexpected support. The value of unexpected partnerships could all flourish –or wither, based on the student experience and effort at relationships –the personal connection. Alumni and other networking efforts can gain participation by emphasising individual and mutual benefits –information, support, ambition, help, experience, protection, influence, progress and ultimately, power.

Consider the following scene of South African secondary and higher education over the past century… Chaos, riots, burning, strikes, protests, boycotts, crime, resentment… utter indifference and gritty determination. Comparatively few students support their alma mater, once alumni… Africa has many successes but receives limited support from its scarcely tapped alumni networks –even when those networks have received significant resources, support and benefits. When one considers the millions of those enriched by the experience yet do not contribute or participate, more research and attention needs to find out why they do not –and what would persuade them to. This could be presented in a survey in their final year analysing results. Yet by focusing on the techniques of networking, campus experience and other approaches detailed in this charter for Africa’s maritime horizons, alumni can transform into the roles indicated above… This would further help Operation Phakisa to become a reality through access to far more resources. Think of what might be attained with alumni patronage and meticulously wrought networks.

Therefore, in contrast; this report proposes maritime education campuses and Operation Phakisa stakeholders turn to the example of the USA/UK; whose students enable them to afford entirely new campuses, halls of residence, specialised equipment, research chairs and scholarships out of appreciation and gratitude. Sponsors become generous to those whom they feel have treated them well –as one of the best experiences of their lives –or it is meant to be. It is worth considering what factors promote networking and alumni contacts –and which actively discourage them. Although not all may be willing or able to contribute –a significant percentage might be able to, if encouraged and approached. However, the more inclusive they feel towards others socially, their campus, host environment and nation, the more engaged and interested in their experience; the more they feel they have profited and received the support, resources, attention and respect they feel entitled to –the more they are likely to be willing to reciprocate. Loyalty, hope and ambition need to be encouraged where possible. Offering alumni events, opportunities, commemorations and prizes of achievements and postgraduate/offspring fee discounts can assist this. The aim should be to promote cross-generational and institutional loyalty. Follow up surveys to see how their careers have progressed is another step. Forming alumni chapters across nations and a dedicated Alumni Office with events, solidifies connections and relationships. Core networking elements which extend to alumni –include timely reminders –but allowing pauses after any particular assistance so they do not feel exploited.

Schools do not mention how to begin this networking process –how to socially communicate with those you cannot easily relate to. Effective diplomacy and tact may help. It is essential to have realistic expectations of how far these networking techniques may go –it may fail completely –and what can be expected of people. There is only so much that anyone might be prepared to do. Patience, perseverance and willingness to move on from failure/wasted efforts, aid this. Alumni like other stakeholder contacts are more inclined to be generous if they feel that they can make a difference, with a greater physical presence –or less erasable legacy. Their contribution needs to feel meaningful to them –So invite them, thank them, honour them –appreciate them. But equally, they do not necessarily wish to feel as if they are a walking free ATM, permanently offering withdrawals. Transparency and accountability help –knowing exactly what the consequences of their funding will be. Thanking them personally for even responding –but also any effort they have managed, provides more sincere gratitude. Others may respond favourably to feedback for any assistance. Granting this ensures they feel appreciated –or they may simply be curious and interested in the projected outcome. It motivates them to connect during other occasions. Impressions always matter –so they need to be forethought of.

Only a small percentage of people are likely to participate in alumni events and opportunities –unless early courted and recruited. It is crucial to note the extent to which people remain accessible, interested, motivated and active. The self-advantages need to be re-iterated constantly. Updating alumni over events and other achievements, to have the relationships in their minds and how Operation Phakisa is also strengthened indirectly. There is a far greater chance of serendipity –in innovation, ideas, collaboration, experiences and achievements –if the right people and conditions interconnect. Without alumni and stakeholder relationships, Operation Phakisa and maritime education is far less likely to become a reality through squandering this trove of human capital and being under resourced. Therefore, it is imperative to invest in institutional capacity, so people can participate and support each other along with an African Ocean Economy.

## CHAPTER 12: CONFERENCES

To assist Operation Phakisa and maritime education; this proposal details the role that conferences can serve. It concentrates on how to enhance students, faculty and other participants’ capacity to be accepted at them and succeed. It summarises certain, prime existing South African, African and global conferences, which could further solidify the presence of Operation Phakisa. Aside from other chapter sources, it specifically details funding sources in which South Africa could apply to host its own events in existing areas and what those events could accomplish to launch other areas globally...

For many in the modern world, conferences are highly valued. Whilst highly productive, dynamic, creative individuals consider these to be pointless excuses to blather on and waste time/resources rather than advancing forward with constructive work, others perceive them as essential for a number of reasons. Most obviously, conferences can facilitate an exchange of ideas and promote research. In a world of increasing complexity and specialisation with so little time free; it can become increasingly challenging to remain hyperaware and up to date with all developments in a person’s field, career and organisation. In 1 or 2 days –even a week; if strategic, one can assimilate a year or more’s worth of information, resources and contacts necessary to remain relevant. Therefore this report recommends conference participation can be highly beneficial to progressing Operation Phakisa, in showcasing our achievements and gaining experience. Therefore, we should encourage our fellow Africans to seek funding to go, provided it does not deter from their learning experience and progress.

To succeed, host institutions can counsel those intending to present to consider certain elements to improve their chances. More cynically and realistically, they are far simpler to be accepted for than to publish a journal article –probably from a profit perspective. A conference abstract has to be unrelated to have a high probability of being rejected. Even if one cannot afford the expense of physically attending, provided one pays the registration fee –it still appears in the conference proceedings as published output and still contributes towards one’s CV/academic quota etc. Essentially a conference abstract is constrained to 200-250 words, aside from a very small proportion moving towards the extended abstract of a 500 word maximum. The most significant challenge is to capture the scrutinisers’ attention to be accepted along with those who might prove to be your future audience and network of contacts, research collaborations, funding potential, possible award providers and other possibilities. In a world of limited attention, far more rely on this summary and succinct presentation, than actually take the trouble to read the actual paper supposed to accompany it. An abstract structure, whether for a conference, journal or industry report consists of several key elements: Purpose essentially provides a background to the paper, identifying the existing issue, problem, concern, question or hypothesis, providing research context to motivate the significance of your chosen topic. Method/Design outlines if it is a literature review, a case study, an experimental design or some other approach and any methods utilised. Findings provide the results of your research, whereas originality/value indicate where your research differs from existing sources, why this research was undertaken and what are the theoretical implications and pragmatic policy implications for stakeholders along with potentially suggesting directions for future possible research. This essentially replicates the intended format of the paper itself.

To go for conferences when you have the chance to add something to one’s CV. Previous chapters have indicated the high prospects of scholarships to those who deserve it –especially internationally. Most universities will sponsor at least one conference for their students. Therefore it is advised to devote specific funding to this –for undergraduates, postgraduates, faculty, researchers and support staff –those who might be able to attend this. The better universities allow for several funding rounds and opportunities –as a candidate, I was only officially permitted one which I had to motivate for. They then messed up the timing and arrangements. Given the complexity of arranging logistics and life –this should adhere to rigorous, defined time periods and the funding once approved should either reimburse the candidate, be distributed by a responsible party/official. Otherwise the applicant should be trusted. Centralised systems may be more cost-effective and controlled to a point but they stymy those with atrociously taut deadlines. Although it possesses certain benefits, the participant should compose a motivation to attend as a specific criteria the host can use to determine it –especially given scarce fiscal resources and the opportunity cost of someone else.

For example, the host could require proposed conference details, itinerary, details of participation and proof, whether any other or previous funding exists and a CV. This could particularly focus on research output/other achievements that might be relevant along with past awards/grants, proof of stakeholder and community engagement related and research milestones. They could provide a budget cost and a personal statement motivating how funding this conference/travel would add value to their research/employment etc. A further supporting statement from their supervisor/leader is also advisable. Several criteria are important to consider –that can advise the applicant. It is advantageous to choose it based on the prestige and reputation. A distant venue in a part of the world you really want to travel to, with leading experts that can help improve your networking and quality of research are factors. The timing is pivotal –if an applicant is restricted in the number of chances and successes. It helps to have some results but not to time it so that it is not missed out at all. Therefore it can be constructive to at the very least mention the idea to one’s supervisor asap and to flatter them by seeking their advice on the submission of the proposed conference abstract, full paper and any potential other research output/ proceedings so they are more attached to it and the notion of spending the time away from your formal degree, research or employment along with any additional research funding. After a conference or any event, it can be useful to exploit potential information from contacts whilst thanking the organisers. This ensures that stakeholder networking has most success when fresh in people’s minds.

South African, maritime related conferences or those that could host maritime themes are summarised in Table 6 below. SANCOR’s website indicates a considerable number. In addition to these, this report proposes more conferences and events are specifically devoted to maritime education, careers, research projects, students, small enterprises, larger businesses, community development; skills development, tourism, economy products and technology. An event could consider maritime applications to non-maritime traditional products, services and technology.

Table 6: SA Maritime/Other Conference Event

|  |  |
| --- | --- |
| **Table 6: SA Maritime/Other Conference Event** | **Location/Year** |
| Africa Automation Fair | Johannesburg, 2017 |
| Connected Industries Conference | Varies |
| Economic Society South Africa | Varies Biennial |
| Ethekwini Maritime Cluster Maritime Skills Summit | Durban Annual |
| Interdisciplinary Research, Innovation and Postgraduate Conference | 2017 |
| ISERD Conferences | 2017 |
| Marine and Coastal Educators Network | Varies, Annual |
| Marine Insurance Risk and Safety Africa Conference | 2015 |
| Maritime Summit | Eastern Cape, 2016 |
| MLASA Conference | Varies, Annual |
| PSETA National Skills Conference - Productivity SA | Varies, Annual |
| SA Aerospace, Maritime and Defence Industry Association Homeland Security Conference | Varies, Annual |
| SA Innovation Summit | 2017 |
| Southern African Marine Science Symposium | Varies, Annual |
| Southern African Transport Conference | Varies |
| South African Maritime Industry Conference – | Varies, hosted only once every 3 years, |
| IDC, Youth Entrepreneurship Conference | Varies |

African Maritime related conferences are summarised in Table 7 below:

Table 7: African Maritime Conference Event

|  |  |
| --- | --- |
| **Table 7: African Maritime Conference Event** | **Location/Year** |
| African Marine Waste Conference | PE South Africa, 2017 |
| African Ministerial Conference on Ocean Economies and Climate Change | Mauritius, 2016 - |
| African Ports Evolution | Varies, Annual |
| African Ports Expansion Conference | Kenya, 2017 |
| Africa PPP Conference and Exhibition | South Africa 2017 |
| Fifth Benguela Current Commission Ministerial Conference | Namibia, 2016 |
| Heads of African Maritime Administration Conference | Nigeria, 2017 |
| Indian Ocean Rim Association Conference Blue Economy | Comoros 2017 |
| Coastal and Maritime Surveillance Africa | Ghana, 2017 |
| Intermodal Africa | Varies, Annual |
| Maritime Africa | Varies, Annual |
| PMAESA | Varies, Annual |
| Conference Dialogue on Blue Growth and Economy: - | Cape Verde 2017 |
| Oil & Gas Africa | Varies –South Africa, 2017 |
| AU Extraordinary Summit on Maritime Security and Safety and Development in Africa. | Togo |
| African Maritime Domain Conference –Law of the Sea | 2014 |

Ocean Partners Organisation, Informa Events, Conference Alerts, Conference Events and Conference Series websites provide sources. Several of the multiple, global conferences are summarised in Table 8.

Table 8: Global Maritime Conference Event

|  |  |
| --- | --- |
| **Table 8: Global Maritime Conference Event** | **Location/Year** |
| AMBIO (Advances in Marine Biogeochemistry) Conference | Varies, Annual |
| Coasts and Ports |
| IAME –first African conference in Kenya 2018, (yet Kenya is not recognised more maritime education/maritime focused economy); |
| IAML, IAMU, IAPH, IMO |
| IEEE 7th International Conference on Underwater System Technology: |
| International Association of Marine Insurance |
| International Coastal and Marine Tourism Congress |
| International Conference on Education, Business, Humanities, Social Science |
| International Conference on Oceanography & Marine Biology. |
| International Conference on Sustainable Industrial Engineering |
| International Symposium on Marine Engineering |
| Oceans 2017 |
| Oceanography Congress |
| Science Globe International Research Conference STEM |
| SNAME World Maritime Conference |
| World Aquaculture Congress Conference (South Africa 2017) |
| World Maritime Rescue Congress |
| World Maritime Technology Conference |
| World Ocean Summit |
| WIOMSA Scientific Symposium |
| World Transport Congress |

Sources to host conferences, interactive stakeholder workshops, seminars and guest speakers could include professional associations, corporations, government, academia, other previously mentioned stakeholder contacts and the community. Within South Africa, TETA, MERSETA, BANKSETA, THETA, FOODBEV, AGRISETA, INSERTA, W&RSSETA, FASSET, all have potential links to Operation Phakisa. The NRF offer a conference hosting fund. In concentrating on education, employment, skills development, outcomes and opportunities; these sources can initiate capacity building and provide funding/support. Internationally, professional societies and foundations also sponsor conference funding. For example, TKF Foundation fund seafarers, maritime cadets and others to attend conferences/establish. K-RITH Connect Africa Scholarships fund Africans with no other conference prospects to participate. However, the one advantage over conferences is that the participants themselves and other sponsors can cover costs, provided it and the logistics are arranged. Therefore for the emergent research areas in the above curriculum, South Africa and ultimately Africa could pioneer maritime conferences. South Africa could create conferences in areas from the maritime space economy, to maritime cybersecurity to maritime risks and futures to maritime health, marine tourism, history, archaeology culture, technology, submarines, maritime finance and insurance This would attract international participants, sources of funding, collaboration, exchanges, partnerships and other flourishing possibilities to consolidate the reputation of Operation Phakisa, our ocean physical and knowledge economies to ensure a true African Maritime Enlightenment occurs.

## CHAPTER 13: JOURNALS, PUBLICATIONS AND OTHER RESEARCH OUTPUT:

In preparing Africa for a maritime education future, our institutions may need to depend on outsiders for support. Whether accessing funds, seeking employment, gaining networking connections, enhancing personal publicity over achievements or enhancing the reputation of our institutions; the global world often only recognises, official, published peer-reviewed output as worthy. As detailed in this author’s forthcoming exposure of reforming higher education and the PHD experience: ‘*How Our Universities Fail To Advance Our Humanity,’* this is regarded as the central barometer of academic success. The sole criterion on which scholarships, tenure and ratings are motivated consist of the ability to secure publication in so called peer-reviewed journals. These journals are valued on the basis of reputation –more specifically a metric known as the impact factor. The higher the impact factor, the greater the journal prestige. This chapter therefore proposes key techniques that can be taught to enhance the probability of publication success or which contribute towards failure. It then details the central journals to target that relate to Operation Phakisa. It mentions certain predatory publishers to avoid to forewarn people. It considers why publishing fails existing scholarship in its present status. This chapter mentions the role of journals, publishing and research output for Operation Phakisa. It details how it can be reformed to motivate participants and support maritime higher education/research, given existing low rates of published success

Given it can be a lengthly, emotionally splattering, soul-wrangling experience, people should consider why they wish to publish their research and in which form. In academia it is expected and mandatory, but for those of us who seek life beyond university, the motivation to persist on this time engulfing, ordeal needs to be considered –if only for what it demands from you personally. However, little formal guidance is granted by places and people of authority –. Many leave it to the discretion of the overcommitted, harried supervisors or the ignorant, fledgling candidate to figure it out - alone! The following techniques gained from experience, provide partial insight into ensuring that any African who wishes to contribute. It is important to pursue methods to communicate and publicise their research –where it really matters, aside from traditional journals and reports. Indirectly there are two approaches to succeed. The first is to really focus on networking, publicity and contacts… It’s not always what you know but who you know that counts in marketing. The top journals often grant preferential treatment to previously published authors, those that have a high impact factor, those who have reviewed –or offer some connections.

The second is more traditional for those lacking this personal influence. In response to the fact that my supervisors and universities created this unreasonable expectation to publish research output, I sought advice from a variety of areas beyond them including books, the Internet, contacting other students, academics and policy makers who had succeeded –or at least experience. I also placed desperate appeals to the journal editors and professional reviewers themselves to decipher this mystery. Although rejection is painful and the probability of actual publication is remote, there were a number of publishing techniques and tips that arose through months of slogging laboriously to increase potential –or minimise automatic rejection. For example, publication is simpler if you are willing to pay substantially for so called ‘open access journals.’ Predatory journals solicit articles but possess limited value.

All journals are rigidly obsessed with their guidelines, presentation style and structure. In particular, references can be brutal as each has peculiarly idiosyncratic formats. Tools including Endnote can simplify this –although that requires familiarity and manual tracing/converting of certain references. Additionally it helps to cite past journal articles flatteringly. Even peripheral articles of minor experience –provided they appear in past articles receive attention. Journals prefer a paper that clearly present its incremental contribution against related literature in the areas rather than something planet shatteringly, original by clarifying: (1) *the prominence of the issue addressed and problem solved, (2) originality and distinctive features of proposed methodology/ models/approaches against published methods, and (3) important findings/ managerial insights/ policy implications drawn from analytical results.* Journals are biased towards empirical work; citations of myriad previous articles and results. They favour generalised results over local case studies; are biased in disdaining junior academics and students no matter how impressive. They claim to seek original contributions but limit such: The Research Question needs to be motivated as to why it is significant and worth publishing/researching. What difference will the method make and how does it differ/improve upon existing sources and linked clearly.

It needs to be able to have enough new and significant information adequate to justify publication, quoting sufficient sources with enough analysis (at least 50-70 unless deeply empirical). They favour extreme conciseness –penalising wordiness or excess page length. The method’s argument needs to consider the theoretical, conceptual and analytical framework, with a well justified and designed research method. All sections including results and conclusions need to logically connect to the method. The paper needs to be professional in layout, technical but still understandable. One indicator could be the Word readability statistics –the average words per sentence, the Flesch-Kincaid level and the Flesch Readability Ease level, appearing after a spelling and grammar check.

Journal articles like conference papers include the title, author/s affiliation, abstract and keywords, mentioning funding sources, acknowledgements and references to conclude. Divergent types of publication papers including the more conventional structure with purpose/aim, literature review, method, findings, conclusions and policy implications/future directions of research; and those that are much rarer with far lower probability of being published but more valued as conceptual literature papers. Conceptual papers occur if you are not making an incremental contribution to research as with most, or applying an existing theory/framework but have something entirely new and brilliant. Then there are literature review papers meant to summarise but increasingly more stringent requiring formal methods and “results,” –preferably empirical from an editorial perspective. Literature review methods can be summarised into issues based, narrative and systematic. Pautasso 2013 summarises ten simple rules for writing an effective literature review.

**Rule 1: Define a Topic and Audience (Important, Interesting, Well Defined)**

**Rule 2: Search and Re-search the Literature (**Include summaries of past literature, careful records of all sources and define search inclusion/exclusion criteria.)

**Rule 3: Take Notes While Reading**

**Rule 4: Choose the Type of Review You Wish to Write (**As above or mini versus full)

**Rule 5: Keep the Review Focused, but Make It of Broad Interest**

**Rule 6: Be Critical and Consistent:**

i. the major achievements in the reviewed field,

ii. the main areas of debate, and

iii. the outstanding research questions.

**Rule 7: Find a Logical Structure**

**Rule 8: Make Use of Feedback**

**Rule 9: Include Your Own Relevant Research, but Be Objective**

**Rule 10: Be Up-to-Date, but Do Not Forget Older Studies**

To publish effectively and strategically involves not just the right topic with a significant literature review, method and findings but the right choice of journal/editing. SAIMI and other maritime education centres will benefit from achieving professional guidance but also personal support. Rejection and censure can be devastating. Significant amounts of patience, dogged persistence and empathy are advised to ensure candidates remain healthy and productive to other affairs. Specifically, Maritime Policy and Management advised to ensure that you show that your manuscript is relevant to the journal (maritime focus), has reviewed existing relevant manuscripts published by the journal (to show this link) and is well structured and thought out. It is also important to make the link between theory and reality as theory can only be a representation of reality and the shortcomings should be examined in your discussions. Research also needs to be effectively communicated so non-experts can have some understanding of the main points. It needs to be relevant. It helps if you can persuade you supervisors or someone relatively known/ established in that area –or at least in that journal to co-author not just to provide feedback. Journals like to be cited as this perversely inflates their own impact factor statistics….–so cite even peripheral studies over more relevant journals given concise word limits, if they occur in the same journal field. The most obvious is to check past issues –copies of those accessible online or in print given specimens are often freely available to save the expense of purchase. Increasingly, editors expect a certain consistency of International English but not at native speaker fluency but second level. An increasing number of editors and reviewers are centred in Asia. Therefore research past article examples, the editorial/review board and send a personal email for advice to customise publications. Avoid plagiarism even self citation and reuse–Cross-Check Software or Turniturn are often used by editors

Zwaaf in a 2013 article cited ‘*8 reasons I accepted your article’.*

**1. It provides insight into an important issue – for example, by explaining a wide variance when numbers are spread out from the mean or expected value, or by shedding light on an unsolved problem that affects a lot of people.**

**2. The insight is useful to people who make decisions, particularly long-term organizational decisions or, in our particular field, family decisions.**

**3. The insight is used to develop a framework or theory, either a new theory or advancing an existing one.**

**4. The insight stimulates new, important questions.**

**5. The methods used to explore the issue are appropriate (for example, data collection and analysis of data).**

**6. The methods used are applied rigorously and explain why and how the data support the conclusions.**

**7. Connections to prior work in the field or from other fields are made and serve to make the article's arguments clear.**

**8. The article tells a good story, meaning it is well written and easy to understand, the arguments are logical and not internally contradictory.**

Certain techniques which contribute towards an article’s failure or rejection also need to be avoided and taught: These include the following suggestions from the International Journal of Supply Chain Management:

**1) Lack of Theoretical Contribution (**It needs to indicate how the research actually adds to or modifies theory not just applying existing theories with a different example and nothing original.

**2) Poor writing or grammar (**Proof read)

**3)** **Too specific to research context, to a certain region or country** –not generalisable

**4)** **Using context as a contribution (**Unless a theory fails to predict specific results)

**5) Failure to contribute to the literature** (Cite journals/research output in fields specifically related to the journal/publication and related past issues/publications.

**6) Failure to provide actionable recommendations for practitioners**.

**7) Poor article structure and failure to include basic elements.**

a. The article should start off with motivation for the research, defining the problem in a way that shows relevance to both academicians and practitioners.

b. The research question and/or statement of purpose need to be very clear and stated early in the article. The research contributions for theory and practice need to be explicitly stated in the introduction.

c. The article must include enough of a literature review to show where this article “fits”

d. Theory needs to be discussed throughout, and emphasized on both the front- and back-end of the article.

e. The method description and analysis procedures need to be consistent with other recent articles published including the research context and specifics regarding the research population or sample frame

f. The results need to be presented clearly and concisely, yet with enough detail to demonstrate validity and reliability.

g. The article should include adequate discussion, and further describe the previously stated contributions and implications for theory and practice.

h. There should be a presentation of limitations plus future research ideas.

The central journals to target that relate to Operation Phakisa are credible using the Thomson Reuters Impact and SCIMAGOJR Impact Factors/websites to rank international, peer-reviewed journals, recognised regardless of discipline…

1 Transportation Research Part B: Methodological

2 Journal of Travel Research

3 Transportation Science

5 Tourism Management

6 International Journal of Sustainable Transportation

7 Transportation Research Part E: Logistics and Transportation Review

8 Transportation Research, Part C: Emerging Technologies

9 Transportmetrica

10 Transportation Research Part A: Policy and Practice

11 Journal of Transport Geography journal

13 International Journal of Physical Distribution and Logistics Management

14 Transport Reviews

15 Maritime Policy and Management

16 Transportmetrica A: Transport Science

17 Transport Policy

18 Economics of Transportation

19 Transportation

20 Transportation Research Part D: Transport and Environment

21 Maritime Economics and Logistics

22 International Journal of Tourism Research

23 International Journal of Logistics Management

27 International Journal of Shipping and Transport Logistics

29 Research in Transportation Business and Management

31 Journal of Transport Economics and Policy

32 Journal of Transportation Engineering

33 Research in Transportation Economics

34 World Review of Intermodal Transportation Research

35 Mobilization

38 Transportation Planning and Technology journal

39 European Journal of Transport and Infrastructure

42 IET Intelligent Transport Systems

44 European Transport Research Review

45 Case Studies on Transport Policy

47 Transportation Letters

48 Journal of Transportation Security

49 Journal of Tourism and Cultural Change

50 IATSS Research

In engineering these include:

1: Computational Mechanics

2 Coastal Engineering

3 International Journal of Impact Engineering

4 Marine Structures

5 Nonlinear Dynamics

6 Maritime Policy and Management

7 Journal of Atmospheric and Oceanic Technology journal

8 Probabilistic Engineering Mechanics

9 Applied Ocean Research

10 Limnology and Oceanography: Methods

11 Ocean Engineering

12 Naval Research Logistics

13 International Journal of Engine Research

14 Journal of Waterway, Port, Coastal and Ocean Engineering

15 IEEE Journal of Oceanic Engineering

16 International Journal of Marine Energy

17 Methods in Oceanography

18 Ships and Offshore Structures

19 International Journal of Concrete Structures and Materials

20 Journal of Marine Science and Technology

22 Structure and Infrastructure Engineering journal

23 Journal of Offshore Mechanics and Arctic Engineering

24 International Journal of Naval Architecture and Ocean Engineering

25 Mechanics Based Design of Structures and Machines

26 Journal of Ship Research

27 International Journal of Structural Stability and Dynamics

28 Coastal Engineering Journal

29 Journal of Navigation

30 Acta Meteorologica Sinica

31 International Journal of Offshore and Polar Engineering

32 Proceedings of the Institution of Mechanical Engineers Part M: Journal of Engineering for the Maritime Environment

33 Oceanologia Open Access

34 International Shipbuilding Progress

35 Journal of Marine Science and Application

36 China Ocean Engineering

37 Marine Georesources and Geotechnology

38 Latin American Journal of Solids and Structures

39 Desalination and Water Treatment

40 Water Science and Engineering

41 Transactions of the Royal Institution of Naval Architects Part A: International Journal of Maritime Engineering

42 IEEE Electric Ship Technologies Symposium,

43 Polish Maritime Research

44 Marine Technology Society Journal

46 Journal of Ship Production and Design

47 Ship Technology Research

48 Chuan Bo Li Xue/Journal of Ship Mechanics

49 WMU Journal of Maritime Affairs

Be wary of predatory publishers in the urgency to be published. These frequently bombard inboxes of hapless, desperate, fractured researchers, seeking to secure tenure and justify their several year commitment to graduate or postgraduate studies/ a profession in research; from their school, from their funding agency; from peers; from others… especially after conferences and other events. Trawling the Internet; they promise a quick solution –they will publish your brilliant masterpiece… it is only later that you realise you will have to pay heavily for the price; that you forfeit all intellectual property and copyrights in perpetuity –and worse; it does not make any difference or matter because these journals have no impact factor or credibility among any who matter. Worst of all; this threatens one’s own credibility, forever tainted with the stigma of desperation and being incredibly gullible. Predatory publishing sources can often be avoided through a single Internet search –past reviews of dissatisfied and connected authors. They generally have a suspicious address and lack a recognised impact factor. To assist the future of African maritime education, the following from Beall’s List are predatory journals: Since January 2017, the provider has been silenced and the list withdrawn but is still credibly followed.

* 1088 Email Press; 2425 Publishers; The 5th Publisher; ABC Journals
* A M Publishers; Abhinav; Academe Research Journals; Academia Publishing
* Academia Research; Academia Scholarly Journals; Academic and Business Research Institute; Academic and Scientific Publishing; Academic Direct Publishing House
* Academic Journals; Academic Journals and Research; Academic Journals Online
* Academic Journals, Inc; Academic Knowledge and Research Publishing
* Academic Organization for Advancement of Strategic and International Studies
* Academic Publications, Ltd.; Academic Research Journals
* Academic Research in Science, Engineering, Art and Management
* Academic Research Publishers; Academic Research Publishing Agency
* Academic Research Publishing Group; Academic Research Publishing House
* Academic Scholars Publishing House; Academic Sciences; Academic Star Publishing
* Academic Web Publishers; Academic World Education & Research Centre
* Academic Direct Publishing House; Academicians Research Centre
* Academics World; Academy for Environment and Life Sciences
* Academy Journals; The Academy of Business & Retail Management
* Academy of Business & Scientific Research, Academy of Knowledge Process
* Academy of IRMBR International Research in Management and Business Realities
* Academy of Science and Engineering; Academy of Science and Social Science
* Academy of Scientific and Applied Research; Academy Publish
* Access International Journals; Access Journals; Access Publishers; ACT Publishing
* Acta Scientifica; AD Publication; Ada Lovelace Publications
* Advance Educational Institute & Research Centre Advanced Journals;
* Advanced Research Journals; Advanced Research Publications
* Advanced Scholars Journals;
* Advanced Science and Engineering Technology Institute
* Advanced Science Research Journals; Advanced Technology & Science
* Advancement and Development in Technology International;
* Advancements in Science; Adyan Academic Press; African Research Review
* AgiAl Publishing House; Agropub; AINSTIN Knowledge Hub
* AIRCC Publishing Corporation; Aizeon Publishers; Akademik Plus Publication
* Albert Science International Organization; Allied Academies; Allied Journals;
* Ambit Journals; AME Publishing Company;
* American Academic & Scholarly Research Centre
* American Association for Science and Technology; American Journal
* American Research Institute for Policy Development; American Research Journals
* American Research Publications; American Scholarly Research Association
* American Scientific Publishers; American Scientific Research Journals
* American Society of Science and Engineering;
* American V-King Scientific Publishing; Andrew John Publishing Inc.
* AES Journals in Engineering Technology, Management, and Sciences;
* Annex Publishers; Ansinet (Asian Network for Scientific Information)
* Antarctic Journals; Aperito Online Publishing; Apex Journal
* Applied Science Innovations; APST Publication; Aradhya International Publication
* ARC Journals; Archers & Elevators Publishing House; Archyworld; ARPN Journals
* AS Publishers; ASD Publisher; Ashdin Publishing; AshEse Visionary
* Asia Pacific Institute of Advanced Research; Asian Academic Research Associates
* Association for Sustainable Education, Research and Science (ASERS)
* Association of Computer Electronics and Electrical Engineers (ACEEE)

Although incomplete, any journals or research output that derives from the above should be avoided. The list above does not even complete A!

This report considers the failure of modern publishing to advance Africa’s future –let alone Operation Phakisa and maritime scholarship. African journals have a higher probability of being interested in our research but this must be offset against the recognition that not a single high impact factor journal is based in Africa –even South Africa. It becomes more challenging for our continent to advance our research to the world. Globally, publishing also fails to advance our planet. It can be extremely challenging to publish yet the security of tenure exists on the power wielded by an unelected, unaccountable and potent cabal of unqualified editors, reviewers and professional readers no matter how imperative or valuable the work might be in reality, it is often dismissed on spurious grounds such as annoying certain members of the cabal, failure to follow some archaic, pedantic, proofreading requirement or insufficient citation of the journal’s own previous papers or issues. This author has pioneered the first academic work in several areas, especially as an African and have known others who have similarly done so. .yet work has often been rejected as unoriginal or lacking references from that journal… despite journals claiming to prize original research. Yet how much research languishes, simply because it can never be published –because universities insist on this pressure yet provide no forum to do so?

In addition the process of relying upon a handful of obscure journals is arcane and obsolescent to the myriad challengers that plague this world. Publishers complement universities failure to advance humanity with complete and utter irrelevance. They often dictate that articles should indicate specific applications not just theoretically but contribute to policy makers and stakeholders. This often ignores the evident fact that industry, communities and individuals are scarcely aware of, interested or actually bother to read these journals thus further deriding the validity of impact factors… Equally, publishers fail to accept practical industry experience or from non formal academia, even those whose research may be perfectly valid with sound contributions and innovative, prejudiced in requiring submissions to formally proclaim their academic affiliation –often biased towards a recognised list of existing universities. Research of sound quality should concentrate on being disseminated to those stakeholders and researchers most willing to utilise it, provided it is not commercially or otherwise reasonably restricted

**RECOMMENDATIONS**

Therefore, given the need to ensure Operation Phakisa becomes a reality, the following publishing reforms and incentives are proposed for SAIMI/other maritime education centres and funding sources.

* Encourage applications to existing African/high impact factor journals as above
* Establish new journals in existing maritime related fields and emergent research areas in Chapter 3’s curriculum accepting articles of sufficient quality –applying for impact factor.
* Create other journals and research output forms that are far less rigid on the peer review process/pedantic layout etc but focus more on the dissemination of scholarship to encourage students/ non-technical experts
* Establish maritime related publishing houses connected to Operation Phakisa/reputable academic establishments in which those who wish to pay to publish have the option. Alternatively others could be evaluated –on an electronic print to demand format for less popular works. The academic institution/lab/professional association//publishing host could waiver publishing costs in exchange for a mutual profit-sharing agreement –following the lines of UCT, UKZN and other university presses.
* Local specialised volumes/textbooks related to the maritime sector could be published/produced for Africa –connected to the publishing companies –marketed.
* Create publication incentives/conference support grants –offering fixed amounts for those that manage to publish in credible journals –to motivate students/researchers. It could be evaluated competitively –in number of output, quality of journals and in impact factor or citations.
* Recognise not just the number/quality of publications as the sole/prime source of funding/ tenure security/awards etc –but also book chapters, conference proceedings, reports and other less conventional research output

## CHAPTER 14: INTELLECTUAL PROPERTY AND ENTREPRENEURSHIP

From 2002-2007 the foremost universities in South Africa/Africa filed only 2-12 patents. Globally, Africa contributes >1.5% of the world’s research output. We invest proportionally less in research and development as a proportion of GDP but seldom consider how to maximise the impact of research whilst simultaneously preserving the incentive to do so. In an era of increasing cyber security, rampant crime, piracy, plagiarism, confidentiality and privacy violations, unethical academics, bureaucratic obstruction and ruthless competition; our knowledge contributions and effort are under threat, unparalleled in millennia of scholarship. Policies need to be reformed to reflect this along with countering social media, ‘fake news’ and other electronic era concerns. Therefore, this chapter considers if Operation Phakisa and an African maritime knowledge economy is to become real, its stakeholders need protection. It therefore outlines the existing status of Intellectual Property in South Africa with several points as to how it can be modified to incentivise our creators and preserve our contributions to this future. Recognising existing entrepreneurship efforts have especially failed in our Universities, it describes how we can promote more entrepreneurs to serve Operation Phakisa. This chapter identifies existing entrepreneurship incentives that globally have contributed not just too intellectual property but commercialisation potential.

The role of Intellectual Property and commercialisation should concentrate on encouraging us as Africans to be more expressive and creative, being free and able to translate our ideas. Therefore our governments but also our education sector, its laboratories, academics and professionals also need to be willing and qualified to identify and eradicate barriers. This report proposes to assist visitors, the community, individuals, students, academics and others to commercialise their inspiration where viable and also to protect their contributions. In exchange it proposes a similar partnership to the Chapter on marine laboratories. In exchange for the creator retaining moral rights/copyright use; a mutual funding scheme is promoted – of any shares/post tax profits for a negotiated time period. This could be based on resources used and offerings. If ultimately successful, both commercial and intellectual property advice and assistance can be rewarded as an incentive scheme. In proposing IP changes, there remains the need to simultaneously preserve confidentiality and IP with the open transmission of knowledge. The most significant issues extend to providing security, certainty, enforcement capacity, remuneration and equity. Effective risk management whilst preserving profit and other incentives requires skilled professionals and a specific office attached to SAIMI/ other leading institutions to protect these areas. It will need to consider which rights to grant, for whom and how long they should last for as these have not been considered for Operation Phakisa or in world maritime education.

The current state of South African Intellectual Property follows the world model where the university claims intellectual property ownership as a condition of registration for its visitors, contractors, students and staff. UCT ignores who contributes, what resources are used and in what proportion to discourage creators. Only below R250,000 are they entitled to 50% -otherwise it drops to 33%, even if they receive no benefit or input. The individual has no power and limited incentive to voluntarily disclose and participate its intellectual or commercial ideas with scarce funding accessible. Significant bureaucratic approvals, lack of personal guidance and encouragement and stringent criteria as to what is patentable discourage others. An impartial arbiter does not exist for dispute resolution for most academic institutions. Automatic waivering of rights to the institution plus convoluted warnings over disclosure given intellectual property guidelines and the fact that many do not know how to recognise if their discovery has aspects worth protecting, exploring or developing; all need reform if Africa’s humans are going to be forthcoming.

Outside of UCT, other universities do not simplify the process. Within South Africa the Department of Trade and Industry technically have legal oversight for patents, trademark, copyright and design. However, other stakeholders may be more cogniscent or experienced such as DST/DOT. In 2016 it considered an IP Consultative Framework. The Companies and Intellectual Property Commission needs reforming if it is to satisfy Operation Phakisa. Existing constraints include limited resources, poor physical paper records, storage conditions and an electronic archive with minimal patents/IP details registered. Examiners need greater professional capacity. Higher transparency and accountability would enable stakeholders to identify existing contributions –to contact stakeholders who have produced work so it can be used with compensation. Or it can simplify proposing original inventions. There is no independent dispute resolution mechanism or time period for any person to contest any new patent filed. This penalises past creators along with uncertainty as to the true direction of ownership –i.e. a Vodacom employee and the ‘Please Call Me Service Case’ in the Constitutional Court. Trade agreements need to be renegotiated to incorporate qualified stakeholders are consulted to secure sufficient legal protection given these concerns. Specific reference to Operation Phakisa/ Africa’s maritime economy would enforce the application to our emerging research and innovation areas. The UK 2014 Intellectual Property Act also automatically extends copyright permission locally, if previously obtained elsewhere as a swifter procedure. In seeking freedom of information, disclosure is not necessary. Patents can also be revoked more capably.

The truly committed institution and individual will do whatever it takes to convert the most promising ideas and individuals. They will benefit through the supportive frameworks (previously mentioned). They will also benefit from the particular incentives, facilities and opportunities (detailed later). They will also have the chance to speak confidentially and without prejudice or fear of consequences, in disclosing any violation of intellectual property or related academic crime. This includes plagiarism, supervisor pressure or otherwise. The University of Kent offers specific conditions on the security, confidential disclosure, usage and transferability of IP, with penalties and enforced resources for those who violate usage, which could reassure ours further. As with UCT it claims copyright over University formed teaching, research output, publicity, official publications, media and curricula/exams to avoid conflict of interests. However it differs in preserving the moral rights of authors explicitly and allowing personally developed material to be exempt. Information can be released if parties mutually sign ‘Confidentiality Agreements’. These honour reputation and publicity consequences, preserving confidentiality and effective use. It abbreviates regulation – being more concerned to multiply spill-over economy and other effects. It also allows for exemptions if funding sources/others specifically insist as a contractual obligation on retaining IP ownership. It may own staff IP but it ensures they receive income as compensation, passed to descendants. This report proposes Operation Phakisa consider the role of IP and reform it in consultation with the South African Institute of Intellectual Property Law and other professionals.

The University of Tasmania considers 8 classic stages of commercialisation to offer advice and support, which SAIMI and other maritime education providers could concentrate on.

**I: Research and Discovery**

**II: Disclosure**

**III: Evaluation**

**IV: IP Property protection, patenting and packaging**

**V: Prove of Concept**

**VI: Commercial Development**

**VII: Value adding/Product Refinement**

**VIII: Exit.**

Our maritime economy cannot rely solely on existing efforts. After all… for a hundred years our entrepreneurs have mostly ignored the opportunities offered by the ocean economy. Africa possesses no maritime orientated corporation. Its value chain stakeholders, whether as businesses or individuals; have yet to exploit the existing incentives and options opened by AIMS and Operation Phakisa. Therefore maritime education has to become more enterprising –to initiate entrepreneurship, whether through guided direction, inspiration or spontaneity. Not all campus inhabitants are specifically interested in studying for a multi-year degree. However, existing African universities and vocational colleges may offer formal business qualifications. Unlike their global counterparts they frequently lack the institutional capacity, resources, training and initiative to promote enterprising talent. Some just need, guidance, support and resources. Current universities such as UCT, UKZN, Rhodes, Wits, Pretoria, Stellenbosch and the Free State generally only offer commercialisation advice in relation to IP –and products/services that have direct immediate benefit to the University. It has not filtered down into secondary and primary education, despite globally fragmenting, conventional salaried and lifetime employment security. Despite Operation Phakisa and other initiatives, they do not orientate and persuade students to become commercially literate. And yet aside from the economic and other gains; those who are truly galvanised to create a business –are those more likely to repay student debt, to graduate and to contribute. They are far less likely to rebel too…

Talent and innovation stimulate the economy not just formal research. Our continent needs to generate employers and creators rather than just employees. Maritime education institutions can assist in this upliftment. Therefore, the ideas of succeeding outside conventional employment –in one’s own business will be encouraged at every stage from recruitment to lectures to the Listening Service. This report proposes forming partnerships, spinoff companies and consultancies –revenue splitting or investment sharing in exchange for assistance as described. Several approaches could promote a knowledge economy. It could derive from existing research, various ideas; maritime applications of existing concepts and non-maritime concepts to maritime linked products. Certain gaps and opportunities from aquaculture to marine tourism to yachting could be discussed based on interests. Business plans could then be formed with faculty/students –even as assignments. New corporations could be proposed –or small scale activities. Alternatively, they will be encouraged to consider what could they personally contribute, what resources would they require to make it viable in the long run and what would they and their nation/world benefit from commercialisation? Networking sessions could be hosted with the community, on media and with business –considering developing solutions to various issues/demands. Developing emergent areas presents chances to be global pioneers in the maritime sector. Accelerated or catch up/convergence growth offers more fertile sources to flourish.

**Recommendations**

With all the existing funding and resources that exist, attention needs to evaluate as to why new enterprises are not created. Part of it will be resolved by the options recommended above and below. Part of it is based on existing constraints and challenges. This report proposes the following are resolved if entrepreneurship is finally to become more normal. Asymmetrical information hinders creativity. The more citizens are aware of what these choices are and how they can be resolved, the sooner Operation Phakisa can overcome their reluctance, fear, uncertainty, lack of hope, apathy, lethargy and despair with resolve, imagination, will, energy and passionate zest. Reducing bureaucracy –in approvals/regulations and providing campus facilities can further assist. Successful local case studies could be publicised. Seed capital and other resources also need to be provided. It could involve access to information, skills development, IP/commercialisation, past support, Mentoring, media, campus publicity, support and a space. Ensuring the investment is repayable at reasonable interest rates, avoids opportunity costs of failed investments and ensures the fund equivalent is self-financing and eventually profitable. Greater business partnerships and connections could ensure practical experience is developed –I.e. through a summer internship or Year in Industry. Competitions, prizes and other financial enticements could spur more ambition. The host institution could provide advice on marketing and publicity. Students, staff and the community could have free/nominal rent campus facilities and access to media/free chance to publicise

Harvard publicise advice, mentors and successes on their website. MIT, Oxford and Cambridge created a campus consultancy group –that included students/faculty that outsiders could approach for commercial contracts and advice –using intellectual capital. This approach is ignored throughout the Southern Hemisphere/Africa. The University of Kent employs manifold resources to generate students’ commercial potential. This report proposes Operation Phakisa could emulate the following successes

* Forming an Entrepreneurial, Commercial and Innovation Hub
* Creating collaborative partnerships and derived businesses
* Providing IP and commercialisation/pre-start loan advice
* Training/ Skills development, workshops, review and assessment
* Specialised facilities
* Networking opportunities and alumni contact
* Mentoring
* Year in Industry
* Employability Award Scheme/course credit (See Chapter 15)
* Innovation Vouchers with business -50:50 cost based partnership
* Outstanding Student Entrepreneur of the Year Awards
* Relocation assistance/contact with local science and industry parks.
* Enterprise Skills Award –online quizzes/assignments/course credit to test potential applicants on whether they have what it takes to form a business.

It offers specialised facilities which overcome the constraints that many businesses have in just trying to emerge:

* Professional business registration address and mail forwarding service
* Access to fully furnished workspace units
* High speed WiFi network access
* Kitchen facilities and access to catering services
* Free parking
* Reception area during office hours and related services
* Waste collection included
* Access to the University's information services, including the University library
* Just one monthly bill exists. This is inclusive of utilities (excluding telephone).It offers a price for local students, staff and alumni at a cheaper rate than communities and others.

The University offers various awards and competitions including publicising existing funding sources that could help start-ups. South Africa could produce the equivalent of the 10 pound or R100/R200 competition where participants are loaned the money and have 4 weeks to make as much profit as they can before repaying the money –getting specific other prizes. The equivalent of popular programmes such as Dragon’s Den or other networking sessions could connect to existing businesses/capital providers. The DIY Challenge involved teams coming together to create products and compete for prizes. The UK Universities Business Challenge replicates the business environment to test employability skills against competing university teams in charisma, leadership, critical problem solving, business strategy, creativity, flexibility, teamwork and other skills. Campuses could create specific Student Business, Investment, Financial Literacy and Entrepreneurship societies –offering facilities, funding and other resources. Kent’s ENACTUS Society focused on community projects and links. Finally those who do succeed should be praised, commemorated and supported further. Output could be rewarded. Currently this only extends to token gestures. UCT offer an Inventor Coffee Mug, upon a victorious patent being filed. The South African National Intellectual Patent Incentive Fund used to award inventors R10,000-R25,000 each but it is no longer operational.

## CHAPTER 15: EMPLOYABILITY SKILLS AND VOCATIONAL GUIDANCE

An era of Operation Phakisa and African maritime sovereignty will only dawn when our graduates are able to participate and be globally competitive –as employees, creators or employers. Our students therefore need maritime education that develops their employability skills and vocational guidance. This chapter therefore focuses on these as the epicentre of a maritime centred curriculum, coordinating centre and campuses. It proposes means to improve these areas. Africa’s graduates need greater maritime career vocational guidance and awareness. Aside from centralised student recruitment, publicity, qualifications, general information, careers advice and funding systems; it needs all supporters from industry to teachers to the media and private sector to promote it. Existing and future stakeholders from alumni networks to professional associations, faculty and visitors could all be encouraged to inspire others. Those in a township, a thousand kilometres from the coastline may never even think, let alone dream of such a path, unless they are conscious of it…The purpose of the Chapter 3 course: Ocean Popular Understanding aimed to re-orientate people to believing in the ocean economy and Operation Phakisa as their vocation and their future.

From maritime subjects and specialised high schools to counsellors to religion and NGO’s to the Listening Service to various tests… the maritime sector’s diversity and potential could be outlined and encouraged. Recruitment Fairs for prospective employees could target this and specialised fairs established. Vocational guidance could involve both simulated work environments (including seamanship simulators) and actual visits/open days to ships, ports, aquaculture farms and other various employment opportunities so they can familiarise themselves with what the conditions might be like. However, assessments would have to be realistic. Those with a chance could be encouraged –but those who are not suitable, should be spared the panache and effort as soon as possible –gently. Suffering uncertainty or misconfidence benefits none. But neither does permanent chastisement and complete disembowelling of self-esteem. However, if there is something constructive they could do to get there –this could be indicated. Other means to enhance vocational guidance are to have centralised databases with the CV’s/achievements of every campus prospective applicant interested linked to one of every prospective employment vacancy. Research students and faculty could create profiles linked to their achievements, capabilities and research. Campuses could offer students the printing of business cards to circulate.

Employability skills are left to individual student initiative –with limited success. It creates a self-selecting cycle of those with past wealth, education, experience, connections, skills etc-are far more likely to progress. However a self-reinforcing cycle of poverty consigns less equipped students to fail unless formal systems and personal support is created, for maritime education and elsewhere. The University of Kent Career’s Hub and www.prospectus.co.uk offer thorough, award winning advice on student careers and developing employability skills. Professional associations and contacts frequently provide specific criteria for prospective applicants under their employment sections. To secure employment, connections could develop from many areas –especially each other through alumni networks. Others include: Academic/ Random; Work Experience, family; friends; Unions; Professional associations; Trade/Exhibition Fairs; Funding sources; Politics; Community and social networking. Establish connections with the private sector –especially through flattery –particularly to try and acquire work experience and possible finance opportunities.

One of the most significant recruitment barriers is gaining enough initial experience. Qualifications could be linked to summer internships or work placements in a Year in Industry as part of the degree. Shadowing businesses –no matter how brief, initiates more incisive employees. Campus and local opportunities could be electronically advertised and distributed physically around campus. Vocational guidance could be provided by seasoned veterans and new recruits, not just career advisor bureaucrats, slightly removed from industry. These could focus on what these careers and the working environment are really like to those unacquainted. The problems, challenges and benefits of specific employment could be illustrated vividly. It really helps to have realistic expectations. Those searching could receive professional advice through devoted Career Advisory Centres fully resourced and made aware of this chance at Orientation. This needs to target what are they searching for from a job or a career? What do they seek from employers? What do they seek from themselves? What are they prepared to do to persevere and triumph? Where do they see themselves within the future? Opportunity costs should be graphically portrayed, so they know whether or not they are likely to regret it. There is no point devoting scarce time, financial and other resources to likely failures.

The University of Kent provided multiple specific tools on its Careers website, which we of Africa could learn in forming these centres and networks. It started an Employability Award scheme with quizzes and other assignments including simulated interviews, skills tests, social media, placements and CV’s. It provided a vacancy database, mentoring scheme, networking, CV, employment and other advice/workshops. It advised on skills. It offered volunteering potential, various societies and competitions. It separated students, staff, employers and alumni, diversifying for those for postgraduate study, disabilities and other opportunities. It provided assistance to alumni even after leaving the campus with news, events and advice. It links to Adzuna articles which mention that employers are most searching for CV’s showing employees are organised, possess communication skills, qualified, motivated, flexible, with a degree, confident and committed. It promoted career conversations involving faculty/supervisors. It promoted direct recruitment sessions and entrepreneurial capacity (Chapter 14). Employees are most sought when passionate, innovative, commercially aware, can problem solve, team work, communicate, negotiate, persuade, respond to pressure and time keep.

Essential employability skills for graduates of the future include proactive risk management. It is never too early to start preparing for the future, to developing the skills, experience, qualifications and connections required. Whilst most institutions leave this to student initiative, they really could benefit from some orientation –and it benefits them as well. Students should be encouraged to develop their autonomy, flexibility, persistence, effort and self motivation. They should be prompted to research their prospective employer and career. They should be enlightened over funding sources and other options out there, covering multiple career options across a maritime value chain from ports to transport, to logistics, tourism, aquaculture, engineering, law, business, culture to education. Other skills include mastering time management, productive usage of meetings, basic organisation, teamwork, report writing, IT and communication skills, multi-tasking and self-discipline. Proof read to avoid pedantic or costly errors. Rarely taught include the abilities to intensely focus, to blot out distractions, to survive adverse feedback, counter stress/pressure, bureaucracy; conflict, fatigue, boredom and neurotic colleagues. Learning how to publish, present, network, remain creative and motivated is also essential. Being able to listen, write, read and speak convincingly can avoid the above issues to a high extent, –with issues over miscommunication and misunderstanding. It is important to emphasise what you can personally contribute with sincere conviction, where possible.

Learning how to become more flexible yet preserving personal physical, emotional, mental, spiritual and psychological health is vital to remain even fractionally productive. Recognise limits. Identify that which works and can work. Focus on the solution or outcome not the problem. It is also crucial to be wary of what you reveal about yourself. Consider how factors might be used against you –or for you. Research potential competitors if possible –of the company/employer and how you can propose suggestions to brighten its future. Research adversaries for the same position if it is known –anything to achieve a competitive edge –perhaps even character assassination if discretely/ confidentially managed. Consider consequences of actions over various scenarios. What are the alternatives or opportunity costs if it fails? None of the skills required are once off events. Persisting whether facing success or failure, is challenging, exhausting –virtually impossible but is far more likely to be rewarding than simply trusting to the Fates or altruism.

For Africa’s maritime education and economy to flourish its graduates increasingly need to consider which skills and traits are necessary to remain, which will become obsolete and which will change –continuously. How labour markets will change –with automation, technology and other possible risk, distinguishes the graduate who determines their vocation –from those for whom it is decided or are not invited take part? How can maritime education be translated into practical employment outcomes as a significant indicators of whether investment has paid off? Operation Phakisa needs core skills that will have to be taught by any with suitable capacity –the task of effective recruitment. This report also proposes that once locally developed, these skills are taught across Africa. It proposes African labour exchanges, employment services, qualifications, competitions, websites, employee-employer-researcher-student networks and events are formed across the maritime sector. To gain access to employment this author previously taught the following to university and business/technical college students as Employability Skills for the Maritime Sector.

**GAINING ACCESS**

* **Develop Skills/Education/Experience**
* **Prepare CV/ Cover Letter/ Tender/ Funding Request (See Below)**
* **Research Company/ Current Affairs**
* **Dress/ Appearance**
* **Industry –Connections –locate email, phone, address**
* Another efficient means in getting results was the principle of direct action. It is surprising just how much valuable and essential information is out there –if one bothers to research it properly… for example; if you want reforms or to implement an idea/ proposal.
* **Personal touch –Charisma/ Charm**
* **Interviews….**
* If there is something you believe in that no one else espouses… you are far more likely to be remembered
* **Better to go in person/ professional courier**
* **When emailing a CV –place as text in the email itself –avoid attachments…**
* **Avoid spam main lines –refer to job position etc**
* **Change numbers to words**
* **Professional email address if possible**

A preferred method of contact for this –and for organising in general, –should be email –cheaper than phoning/ fax/ paper alternative. It is easier to track people down by email and to continue to plague them with reminders as it costs nothing. It is also simple to register an email for free. -If you are one of those people who wish to avoid prying eyes from their official email or if one does not get the complimentary yet more prestigious and digitally encrypted university email that most grant to students and whom subsequently retain them for life.

* Other seeds of access occur from the most unexpected of prompters. –The wise person sees an opportunity –and learns to adapt what one has –to what exists in reality. They learn to exploit current affairs/ events to connect to one’s own interests/ principles/ causes.
* Always establish contacts! One never knows when even a chance acquaintance may come in useful –particularly across the globe; environments; scenarios; positions/ occupations etc. It is imperative to take the initiative in acquiring contact details. It is even more so to retain such links, whether for material advancement; mutual satisfaction; attaining of one’s objectives; publicising one’s cause/ increasing one’s influence etc… Consider this too; when doing people favours… Under the principle of self-advantage/ manipulation, eventually you can profit.
* Use secretaries/ security guards etc. –to gain insider access and privilege. It is all about charming those who have access to the corridors of power and influence –who ultimately determine just how seriously a proposal can be evaluated. One should never underestimate the potential power at the disposal of subordinate functionaries; aides; secretaries and others. These include those who influence records/the agenda/implement decisions/ schedule appointments/ organise things –or safeguard access to property or influential people.
* Make an impression! It is all about perception and being visible. Obscurity never aids a cause –publicity and standing out/ presentation and appearance all help –unless the undertaking requires being subtle/ subterfuge. Otherwise; never be afraid to stand out and draw maximum attention or publicity. Silence never gets anyone anywhere –when espousing a cause. Although it can serve well as a strategy –convincing people that you are listening to them; taking them seriously and the time to formulate responses carefully. It is better to be silent and perceived favourably by others for such (as it often implies tacit consent (although it can be conveniently be construed as a denial –disowning agreement later if necessary); as a pragmatic survival tactic, until one has formulated a response….
* It is essential to be polite but persistent. Remind them of your presence but although a reasonable interval before harassing them once more.
* Start today –why delay –given that it takes time for so much to be accomplished. One might as well commence–never hesitating to implement reform; change –or any idea/ proposal –especially when it comes to government. Who else can one trust but oneself in order to achieve anything at all –let alone to

For those who are not fortunate enough to have secured an existing position, have it stipulated in their funding or get offered a chance, the modern world finally arrives at some point as a reality check after cocooned for several years in education. Whilst universities and colleges generally train their students to become professional researchers and teachers, they often neglect the essential task of transferring general employability skills for the future. This is the core purpose of this Chapter –to serve Operation Phakisa and globally competitive generations of African maritime graduates. There are several components to thriving in an increasingly competitive world, where qualification inflation means that you have to pressurise to make an impression on recruiters when others are doing the same, unless your vocation has greater demand than supply. The several key elements include a brilliant cover letter, curriculum vitae and often selection criteria, which enable a candidate to be evaluated for psychometric testing and interviews rather than swift and humiliating rejection. For example, this author’s CV included sections on personal contact details Education, Personal Development Skills, Employability Skills, Work Experience and References. Under education this could relate to all levels including present position. Personal development skills include languages, capacity to drive and information technology/ etc. Employability Skills could include awards, prizes, scholarships and achievements along with members of any networks, sports, leadership activities, volunteering, culture and societies past and present, a list of recent publications and other research output including seminars or keynote addresses. It also helps to supply 2-4 references and an outline of existing employment history.

For format it helps to border, allow reasonable spacing and paragraphing and start with the year/date, then the achievement/employment. It assists to use a font -10-12 size, standardised, neutral paper and background and precise terms/bullet points. It needs to consider why you as a candidate excel and exceed others between 3-8 pages at most. Consider achievements not formal position. Link to public affairs to demonstrate commitment and value. Many any personal ideas to contribute. If reaching the interview or recruiter stage, as with any organisation –academia, political; corporate; government; community etc… it pays to flatter –to appear to develop a keen interest. It helps to brim full of conviction and passion –and energy. It ensures that you are willing to undertake what has to be done –but not to be a doormat. The way to impress people and to make a difference –is to present initiatives and catapult to the top –to bypass those who hinder you in subordinate positions as an underling/ new recruit –and directly demonstrate that you have ideas and potential –to reform the structure. Any idea you have –to make the world different –any potential change you wish to attempt. –It is possible to find a potential conduit willing to receive it and even to act upon it if valid. If all else fails contact the CEO, CFO, HR head or anyone senior with a position to recruit you –top downwards.

Alternatively, one of the hardest things to bear is rejection. If you can possibly tolerate being ignored and not being at the centre of attention; then you are more psychologically conditioned to deal with leadership –which isn’t always about the glories –to quote the platitudes. Those who are more likely to have employability skills under an African maritime economy, will master this quicker. It is also about adapting; resolving and responding to potential crises/obstructions that may occur. People will react favourably to those –who do not harp on about the hardships and problems of the world they face (Nobody likes a whiner!) Given we all have problems of our own in our existence, often we only have a limited degree of sympathy for others for the most part) with support. An even harder thing –is even to be heard... To make an impact upon those in positions of potential power; influence and authority is a challenge… The prospects of doing so; if not possible oneself –ought to be supported and valued in those of others. This is crucial for those who are capable of such, who share (to some extent) your convictions, passions; perceptions/ causes as they themselves can advance these on your behalf. With academics; businessmen, politicians and other core people, it can be valuable approach them directly –flatter them and research their interests... If you appear to ask their opinions and value their judgement (Ask for suggestions even when you have failed), –you may just have your misfortune reversed).

## CHAPTER 16: PROFESSIONAL ASSOCIATIONS AND LINKS

An investment in others is an investment in our own success. Through becoming linked with professionals, Africa’s maritime students and stakeholders can further benefit from networking. This chapter focuses on the role which professional associations can orchestrate for individuals, Operation Phakisa and the future of Africa’s maritime sector. It identifies several of the most relevant and prestigious associations for the various curriculum areas identified in Chapter 2. This provides a centralised source for greater awareness of the opportunities that exist from an initial moderate investment or membership fee. Professional associations can serve countless roles frequently detailed on their websites. Their prime aim is to serve as a networking centre –connecting those of similar interests and experience. They coordinate sources of information, can provide vocational guidance, advice, accreditation and continuous professional development. They can assist members by hosting conferences and events, offering funding opportunities and news of current affairs. Certain associations publish peer reviewed, credible journals. Links can foster experience, employment or assistance and insight into specific issues. Centralised information could simplify faculty or student recruitment. It also assists if professionals seek to benefit from the education sector or can equally provide technical/commercial or other expertise. It can aid in technology transfer, commercialisation and intellectual property as advisors or partners. If guest speakers, seminars and lecturers are necessary, it provides an initial point to procure them.

There are also benefits from greater links, not just to individuals and the host institution but also to the association. It offers a source of revenue, recruitment, support and publicity. For example CV’s reveal significant information. It enhances awareness and possible collaboration with research that possesses commercialisation potential. Most higher education faculties not just existing maritime education have provided minimal attention to maximising publicity, reputation and contacts by forming personal and professional links to all key associations. It enhances the employability skills and calibre of research/general qualifications, aligned to stakeholder requirements. It can provide extremely enriching. In a world bombarded with excess information, these associations run by professionals provide a free yet credible and accessible filtering mechanism. In the future, professional associations could serve a far more constructive use in research, development and commercialisation than at present.

The more resources professionals and users of these associations invest in research, continuous professional development and others, the fewer scarce resources; academia needs to contribute. At the moment, joining is once more left to individual resolve and tenacity. Without a centralised database or specific support from faculty, there may be many who could benefit and are highly interested but miss out. This report recommends to always search for the associations of most value and consider joining them, to benefit. Ultimately it is worth researching them to see that they are reputably worth the value for money. To form greater ties, SAIMI/existing institutions could invite them as speakers to lectures, host recruitment fairs, allow information access, host mutual events, propose competitions, awards and joint collaborations in pilot projects or other research forms. Partnerships could receive preferential access/first buyer status to any innovation developed. They could cooperate in determining the most meaningful issues and solutions to focus on. Although limits exist to professional associations, when developing something as ambitious as Operation Phakisa, given our continent’s inexperience, linking to professionals such as the World Maritime Organisation will accelerate our chances. Wherever, Chapter 2 proposes novel areas, new associations could dawn –i.e. space and the maritime economy, which could attract the world. Certain core South African maritime professional associations include:

* **Durban Chamber of Commerce**
* **eThekwini Maritime Cluster**
* **Island View/Maydon Wharf Leaseholder Association**
* **Maritime Lawyers Association South Africa**
* **Port Liaison Committee**
* **SAAFF (South African Association of Freight Forwarders)**
* **SAAFF Harbour Carriers Division**
* **SAASOA (South African Association of Ship Operators and Agents)**
* **SAMSA (South African Maritime Safety Authority)**
* **South African Shippers Council**
* **South African Association of Ship Repairers and Builders**

The more illustrious professional associations and societies are summarised in Tables 16.1-16.3 below

|  |  |
| --- | --- |
| **Antarctic Science** | **Aquaculture/Fisheries** |
| Council of Managers for Antarctic Research Programmes | Aquaculture Association of South Africa |
| Scientific Committee for Antarctic Research. | Abalone Farmer’s Association of South Africa |
| **Aquatic Security, Conservation and Engineering** | Global Aquacultural Alliance |
| African Water Association | International Association of Aquaculture Economics and Management and. |
| Engineering Council South Africa | Marine Farmers’ Association of Namibia |
| Federation of African Engineering Organisations | Marine Finfish Farmers Association |
| International Association for Hydro-Environmental Engineering | Marine Stewardship Council |
| South African Institution of Civil Engineering | Mpumalanga Trout Forum |
| **Cabotage** | SANCOR |
| African Union, ECOWAS, SADCC | Western Cape Trout Association, |
| MLASA | World Aquaculture Society, |
| SAMSA | World Aquatic, Vetinary Medical Association, |
| **Climate Change** | **Cruise, Marine and Ecotourism** |
| IPCC | ASATA |
| **Human Factors/Maritime Psychology** | Cruise Indian Ocean Association |
| IMO | Cruise Line International Association |
| WHO | Ethekwini Maritime Cluster |
| **International/Maritime Logistics/Business** | PMAESA |
| Durban Chamber of Commerce | RETOSA |
| NASASA: National Association of Stevedoring Associations of South Africa | SATOUR |
| Road Haulage Association | SATSA |
| SAASOA | Seafarer’s Employment Organisation |
| SAAFF | **Marine Biology/Ecology** |
| SA Shipper’s Council | South African Association for Marine Biological Research |
| SAMSA | Society for Conservation Biology |
| SATAWU, Seafarer’s Employment Organisation | **Maritime Archaeology** |
| Transport and Logistics Employers’ Association ( | Nautical Archaeological Society |
| Warehousing and Distribution Employer’s Association |  |

The Aquacultural Association of Southern Africa connects stakeholders with information, events and developments, defending their interests with greater strength than isolated individuals as with most professional associations. It joined the World Aquacultural Society to benefit from global partnerships. Students receive discounted membership –as a common means to engage interest and recruitment. Whilst few specific water engineering associations exist globally, as part of the Engineering Council South Africa, members benefit across interdisciplinary areas from professional standards, continuing development, engineering legislation, guidelines and experts. The top global cruise tourism association –Cruise Line International Association would be an excellent choice to partner with when forming an entirely new area for Operation Phakisa –given African cruise tourism is in its infancy, aside from MSC. It presents over 24,000,000 passengers, 60 cruise lines, 300 companies and 40,000 travel agents.

Table 16.1: Additional Professional Association Links for Operation Phakisa

|  |  |
| --- | --- |
| **Maritime Communications#** | **Maritime/Port Economics/Port Pricing** |
| Comité International Radio-Maritime (CIRM) | ESSA |
| International Maritime Statistics Forum | IAME |
| **Maritime Education** | IAPH/AAPH/European Seaports Organisation |
| International Association of Maritime Lecturers | **Maritime Engineering** |
| International Association of Maritime Universities | IMMAREST |
| International Conference on Engine Room Simulators | RINA |
| International Maritime English Conference | South African Engineering Council |
| International Navigation Simulator Lecturers Conference | South African Institute of Marine Engineers and Naval Architects |
| **Maritime Finance** | **Maritime Health** |
| Baltic Exchange, | International Labour Organisation |
| Chartered Institute of Securities and Investment (CISI) | International Maritime Health Association. |
| International Association of Marine Insurance | IMO/SAMSA/TETA/SAQA, |
| Lloyds | Spanish Society of Maritime Medicine, |
| Spinnaker Global, | World Health Organisation |
| the UK Institute of Chartered Shipbrokers | **Maritime History** |
| **Maritime Law and Diplomacy** | International Commission for Maritime History |
| SAMSA/MLASA, World Customs Organisation, UNCTAD, IMO, Road Haulage Association, SAAFF, SAASOA, SA Shipper’s Council, Seafarer’s Employment Organisation; Transport and Logistics Employers’ Association; Warehousing and Distribution Employer’s Association. | International Maritime History Association |
| **Maritime Law Enforcement** | **Maritime Security, Cybersecurity, IT** |
| MLASA, SAMSA | International Association of Maritime Security Professionals |
| **Maritime Technology** | **Maritime Warfare** |
| IMMAREST | Naval Officer’s Warfare Association |
| Marine Technology Society –US |  |
| **Naval Architecture, Shipbuilding, Salvaging and Repair** | **Nautical/Ocean Engineering –Ocean Renewable Energy** |
| RINA, SAASOA, South African Association of Ship Repairers and Builders, South African Institute of Marine Engineers and Naval Architects, the US Society of Boat Designers. IMMAREST, Society of Naval Architects and Ocean Engineers | IEEE Oceanic Engineering Society  International Association of Ocean Engineers  International Society of Offshore and Polar Engineers |
| **Navy/Merchant Navy** | **Oceanography, Ocean physics, chemistry** |
| International Naval Safety Association | Association for the Sciences of Limnology and Oceanography |
| International Sea Cadets Association | International Association for the Physical Sciences of the Oceans (IAPSO) |
| Royal Naval Association | The Oceanography Society |

Comité International Radio-Maritime (CIRM) represents a marine electronics association of companies to promote maritime communications, research, technology and advice. It influences regulations and technical standards. It could assist Operation Phakisa to improve navigation, radio-communication and GMIDSS. Examples include radar, automatic piloting aids, terrestrial and satellite navigation systems, integrated bridge and navigation systems, electromagnetic and gyro compasses, autopilots and heading controllers. IMLA possesses over 200 members connecting over 50 countries with a membership directory, professional databases and information. South Africa’s maritime law association MLASA dates back to 1974 as a professional association, specialising in key legislation, research, professional training, experience, networking and awareness. IMMAREST was founded in 1889 and membership benefits include a registered charity –the Guild of Benevolence, volunteering, funding, conference and training opportunities. It offers a magazine, careers advice, library resources and networking.

Table 16.2: Other Professional Associations for Operation Phakisa

|  |  |
| --- | --- |
| **Seafaring -Pilots, Tugboat Operators, Navigation** | **Submarines** |
| IAML, IAMU, ILO, WHO | International Community of Submariner’s Association |
| **Surveying** | International Model Submarine Association |
| IMO, Society of Consulting Engineers and Ship Surveyors, | International Submariner’s Association |
| International Institute of Marine Surveying. | **Underwater photography, Diving** |
| **Watersports –Maritime Sports research/training** | PADI |
| KZN Aquatics, | **2Yachting/Recreational** |
| South African Sports Confederation and Olympic Committee | International Council of Yacht Clubs  International Radio Sailing Association  International Sailing School Association |
| Swim SA | Professional Yachting Association |
| University Sports South Africa | World Sailing Federation |

## CHAPTER 17: INDUSTRIAL PARTNERSHIPS

**Stage I: Awareness and Contact:**

Academia and government form the epicentre of partnerships across Africa. The private/industrial sector often exists by chance, in specialised narrow fields, individual circumstances or as an embryo. Despite the significant prospects offered by the investment in a vision of an African maritime economy and expansion in education; very limited industrial engagement, very few partnerships exist… If Operation Phakisa is to exist, this chapter outlines several aspects as to how industrial partnerships could be more strategically aligned, formed and improved to mutually advantage all participants. It proposes that maritime education is transformed into a maritime knowledge economy in which laboratories, other research, education and vocational training cooperate synergistically with industry. It advances that SAIMI/the centralised maritime university/research coordinating sector work to assiduously prioritise these industrial partnerships as the future of maritime education in Africa for the next century. To progress an initial step would be to contact every shipping line, related supply chain, company, financial and insurance services as businesses and professional association not just government. Many of the prime Operation Phakisa/maritime economy ones are indicated by name in this report.

Currently credible efforts have been undertaken by those spearheading Operation Phakisa to engage with industry. However, this has been mostly limited to a few stakeholders, pilot projects and areas such as aquaculture; –when there is so much more potential out there! These scarcely even bother to develop aspects too deeply and review projects for greater performance using historic or international feats as examples So far emphasis has selected a few conferences, networking events, companies or opportunities. The SAMIC 2017 Conference represents an excellent start but should be held more frequently –annually –perhaps more often or with regional variants. It indicated business opportunities in offshore oil and gas, aquaculture, cruise and marine tourism, education and training.

However, the chance to address core industry needs has been absent. For example, this report would propose fundamental surveys for each of the potential maritime curriculum areas, first to ascertain stakeholder awareness of industry requirements. Then to ascertain industry awareness of Operation Phakisa and current academic capacity. It needs to find out what does industry expect of academia/government, what are the constraints, what are the challenges? How could these be overcome? What could be improved/changed? What could be developed? Why should partnerships be formed? How? What areas would industry be interested in collaborating? What areas would certainly be wasted investment or a failure (And why?)

To South African aquaculture successes of Operation Phakisa industrial partnerships; many are government initiated with incentives to attract small holders/emergent/existing businesses. However, few of the more established –larger companies are being actively involved. The DAFF highlights the 2014 pilot partnership of a Hamburg kob farm producing 260 fish at 1.1 kg average weight each. This arose from its first harvest, sustaining income for 21 people. It benefitted from training, inputs and capital assistance. Whilst excellent as a start, this report under its Aquaculture subsection indicated significant opportunities for aquaculture education and research to contribute –and link further.

**Stage II Development: Key Elements in Forming Successful Industrial Partnerships**

* Trust –extent to which it is reciprocated.
* Effective Listening.
* Effective Speaking.
* Regular and Updated Information
* Regular and Updated Communication
* Forethought –consideration of other parties’ interests, reactions and commitments
* Timing
* Extent of Personal Relevance –to the stakeholders involved.
* Stakeholder Benefits –number, extent and success rate.
* Psychology, Expectations; Personal connections.
* Time….
* Patience.
* Independent neutral arbiter for dispute resolution.

Industry remains one of the most undertapped, underappreciated resources –not just of investment but practical results, experience and expertise. It could even provide a source of foreign exchange, direct investment and experience. Companies like individuals can feel flattered, interested or appreciative if others seek to help or learn from them. For example the existing marine industry association (MIASA) focuses on boating. Whilst the current Operation Phakisa emphasis is on seafarers/professional training –developing maritime facilities in Africa could help local industry. –I.e. in vessel design, performance and sustainability –from research into aquaculture, marine ecology, marine engineering, naval architecture, recreation and yachting/water sports. eThekwini’s Maritime Cluster already focus on enterprise development, marine manufacturing, skills development, industry promotion and ship building but it could integrate far more with academia. The Marine Industry Association of South Africa, various yacht clubs, South African Chamber of Mines and the South African Chamber of Commerce and Industry reflect underprioritised areas of industry alliances. Specialists really need to interface to determine the extent to which both general and specific partnerships could exclusively provide multi-party stakeholder profits. Industry could even be approached to see if it has specific projects, resources or data to offer to complement existing and future Operation Phakisa research.

**Types of industrial partnerships include:**

* Commercialisation;
* Education, Skills and Training
* Experience
* Facilities;
* Funding/Investment/Scholarships
* Lab projects
* Networking and Contacts
* Research and Development and IP
* Resources PR –Physical/Human
* Technology Development, Use and Transfer

In order for maritime industry to flourish –academia and other stakeholders could form connections as the basis of partnerships. The focus does not just need to be about pure knowledge and research –but enhancing the maritime economy through developing people, ideas, resources, processes, technology, land, and other factors. The benefits of forming more effective and numerous industrial partnerships not just for Operation Phakisa and the future of African maritime education but its economic destiny, are numerous. It could provide a source of scholarships/funding, professional experience –guest lecturers, work experience –links, access to resources, information, facilities, ideas, data and contacts. Both benefit not just from the research – (success and failure are enriching) but from publicity/reputation, networking and experience. Higher education globally has already benefitted from industrial partnerships and expertise in commercialisation, technology transfer, IP and legal protection, human resources, accounting/auditing, tax, marketing, communication, media relations, customer service, psychology, operations, logistics, business and technical expertise.

It also worth investigating to see if industry is willing to endow specific prizes, chairs, facilities or other resources. Industry beyond just the maritime sector might be interested in ‘Blue Skies’ research –giving individuals chances to pitch and motivate specific project proposals that appeal most to them –allowing for true inspiration or effort. It is pragmatic for industry to form partnerships with the existing and proposed providers of maritime related education and research outlined in this manifesto. Only the largest, most affluent, specialist or a few others have devoted research departments. Many of these lack the fertile pollination of conventional research environments. Both could gain from the data, facilities, capacity, people and ideas of each other. Industry could agree to publish results that retain commercial confidentiality if needed. Hence, they release conditional access to information –significant portions of which are generated but dematerialise into oblivion; not just for South African maritime industry by globally…

Industrial partnerships could become involved in the formation of education and training –to ensure vocational qualifications in particular, do not relapse behind. Degrees will therefore be present and future orientated for maximum relevance. Industry could work with faculty and students to use local case studies as research projects or as text/exam examples, provided confidentiality is maintained. Whilst multiple barriers may appear to exist to Africa’s maritime future; forming industrial partnerships between academia, the community, industry, government and media has to increase the overall probability of victory from greater awareness, information, communication, support and contact. This report proposes regular meetings, conferences and events are scheduled to solidify these connections both socially and professionally. However successful partnerships respects autonomy of thought, work preferences including customised forms of productivity and that not all results can be dictated to or be precisely forecast. It also has to legally protect all parties and the research itself from foreseeable risks, whilst retaining necessary party specific contractual rights.

**Stage III: Expansion into New Frontiers and New Links**

Industrial alliances need to extend to the challenges of emergent maritime research areas, especially as these have not been officially prioritised, protected or recognised as part of Operation Phakisa or AIMS as yet. The efforts for partnerships are maritime focused but could extend far beyond that to other industrial clusters and commercial associations –including Chambers of Commerce and Industry as great networking opportunities. It could extend internationally across African borders and beyond. SAMIC 2017 indicated collaboration with the Norwegians under SAIMI. They have already provided initial advice on how to establish a 50:50% partnership between government and industry –in financing, power and benefit. Various means to ensure constructive clusters, customer orientated and tax incentives were outlined. There is also the potential to develop new maritime clusters. The Eastern Cape has been tentatively suggested. However, no one has considered the Northern Cape or the Western Cape. Nor has anybody proposed extending the concept to Southern Africa. In time, effort could be directed to a Northern African maritime cluster under South African guidance. We could aid Ghana in centring a Western Africa based cluster and another centred around Kenya and Mombasa –or alternatively seek to ensure they do not become a competitive threat. Ultimately as recently developed by Europe, one could consider a federated group –starting locally in South Africa but perhaps ultimately Federating the African Coastline –Pan African Maritime Cluster.

South Africa could learn from the world’s most successful maritime cluster (along with others). Singapore’s Maritime Foundation since 2004 actually was a private not state sector, driven initiative (rarely, although with substantial government support). A Maritime One network works to mobilise interest, resources, members, education, scholarships, training, capital and incentives to support maritime industry; its requirements –and those of Singapore patriotically. It concentrates heavily on publicity, policy support, research, development, capital funding and career awareness/training opportunities. It has Ship Finance, Marine Insurance and Marine Arbitration Working Subgroups which have successfully helped to ensure Singapore remains a world power in these key areas. This is in addition to one of its most significant ports and a substantial maritime academia component at both its leading universities. It even offers special themed TV and video channels. Singapore also possesses a Maritime Cluster Fund, well established. The following courses receive a 50% refund if successfully completed –especially for existing industry but also new students. - *Introduction to Shipping, -Principles of Shipping Operations and Practices; - Principles of Shipping Documentation and Practices; Intermediate Course on Shipping Documentation - Bills of Lading; Principles of Shipbroking and Chartering; Shipping Law and Disputes; Compliance of the IMDG Code for Transport of Dangerous Goods; Container Management and Practices; Marine Insurance; Maritime HR Management; Maritime Labour Convention 2006 - The Concise Perspective.* Bunkering courses offer 70%. Singapore’s other incentives include professional advice; the MSI-Approved International Shipping Enterprise Award; MSI-Maritime Leasing Award; MSI-Shipping-related Support Services Award and ship construction/ local equipment and container purchase tax exemptions.

The non-maritime sector could be more formally investigated for applications and willingness to collaborate –i.e. our historic strength in aerospace, agriculture, conservation, mining, tourism, vehicles and weaponry. They could have specialised events, recruitment fairs, presentations, exchanges, guest lecturers, visits or links to existing/forthcoming events and conferences. The University of Tasmania offer a specialised maritime, commercial orientated unit called AMC Search –targeting industry partnerships, projects and vocational training. Maritime Employees Training Limited works to link Australian seafarers with institutions given their similar scarce skills conundrum. A basic course introduces the Marine Industry and its requirements; which local maritime education could consider to be more aware of maritime industry options. This report proposes that those promoting partnerships research what proportion of the existing marine or general industry has formed partnerships, in what areas and why? They could ask stakeholders what they feel promotes industrial partnerships from existing Operation Phakisa approaches, what fails and what additional incentives could exist? Research really needs to consider why so few actual industrial partnerships exist and how this could be reversed. Why would industry want to partner with higher or even secondary education for an African maritime economy? Research needs to consider just how many patents actually exist and growth rate patterns? How productive have they been?

Ideas could propagate further if our maritime education future included a Year in Industry. This ultimate industry collaboration would ensure that students (and their hosts) gain from a year’s pragmatic experience, reporting their discoveries and actively contributing. A summer internship scheme could range between 1-3 months as a shorter, more time sensitive variant. It not only helps to advance careers but ensures African maritime research and its academics, do not retreat into ivory towers. It helps to inject African solutions into African problems. It is also cheaper for companies to test concepts and ultimately elect whether or not to recruit. Many areas have yet to reach their full productive efficiency – (greatest possible output with the most efficient allocation of resources) or their allocative efficiency (those most sought by stakeholders are actually produced/discovered/improved). Academia could focus on learning from successes, failures and opportunities to develop practical and theoretical applications. One 2015 example even included a locally created modular buoy for real time data that became internationally favoured.

**Stage IV: Reviewing and Monitoring Achievements**

Forging partnerships minimises waste, averts lost knowledge and seeks to counter accelerated entropy/catastrophe. Everyone possesses finite resources –in time and opportunity cost if nothing else. This provides even greater incentives to produce these links, personally, professionally and institutionally. Industry partnerships fail when administration and constraints are ignored; limited or no reviews are conducted; problems or communication, information, poor risk awareness and management. Others may not be commercially viable or have a poor return on investment. The principle of ‘TIA’ – ‘This is Africa,’ needs to be considered (Or TISA). Stakeholders need to consider the extent of partnerships and how appropriate is it? Certain partnerships which are illegal, uncertain, likely to fail, fractious, contentious, controversial, stagnating or counterproductive need to be ferociously gauged apart. Partnerships to align maritime industry –or a more traditional industry/business into a maritime themed outcome; succeed ultimately if they are flexible enough to consider existing constraints, delays, uncertainty, failure and stagnation. Partnerships endure more if they accept the concept of inspiration, serenity and even luck or fate; given the uncertain progress of knowledge, technology, risks, human, economic or environmental conditions.

## CHAPTER 18: PUBLIC RELATIONS AND SOCIAL MEDIA

In a world where so many distractions compete for limited attention, Operation Phakisa is no different. If we are to convince generations of Africans that the path forward involves academies, scholarship and a specialised maritime knowledge economy, then we have to focus on maximising publicity. This chapter therefore focuses on how publicity can be utilised more comprehensively, via public relations and social media to attain this outcome. It identifies current marketing approaches and suggests future directions as effective means of providing information, recruitment and support. If this is to work; SAIMI/any other provider needs to assess the extent to which existing strategies have worked as intended through physical barometers. It most notably must review those flopping. These include enrolment rate changes, successful completion rates, future employment rates, extent of new investment in maritime research; new research output, publications and patents generated, new projects created but sustained along with the extent to which documents have been accessed and downloaded. Resources need to be coordinated more effectively –achieve confidential, intelligence sharing agreements to avoid superfluous duplication. Regular surveys of various stakeholder groups and the general public provide further evidence to support or reject the extent of public relations and publicity to enlighten people. PR also has to consider why any changes might be necessary and how to persuade others to accept these with minimal disruption cost.

Public relations and advertising also focus on the promotion of products and services for which it is hoped a demand can be generated. These need to be as simplistic as possible to convey the messages yet with impressive graphics and professional layout. This extends to maritime research. Ways to honour its creators whilst increasing awareness may be to host Award Dinners, Social Dinners, Exhibitions and demonstrations. Additionally, unique merchandise branded with SAIMI/Operation Phakisa and individual research areas, species and achievements would help more people to note just how invaluable the world’s oceans and local coast environment are, Examples include university branded clothing, crockery, stationary, towels, postcards, models, official works and toys. Even stamps and coins could work for commemorative issues in alignment with the Mint and Post Office.

To ensure our investments into a maritime education future are broadcast further, Africa must embrace global trends in marketing. SAMI is currently on Facebook with a Linked-In account and possesses a professional website as the core of their public relations relationship. It provides policy documents, hosts a few workshops and active involvement in SAMIC and a few other conferences. Other marine supply chain and education stakeholders are similarly traditionally orientated without maximising the options of an increasingly digitalised economy, society and age… Films, radio, Twitter, Facebook, papers, alumni networks, TV, professional websites, associations building relations… social media platforms and websites all provide traditional sources to establish publicity. However, others exist that have not been embraced by SAIMI and others. If South Africa wished to promote international involvement and awareness it could investigate foreign social media channels e.g. China’s Weibo or press. Mobile, tablet and other devices’ friendly versions have yet to be specifically targeted. Electronic prospectuses for campuses, virtual walk through tours including detail on Google Maps; video testimonies of current and former students/faculty, tailored events and functions plus a greater variety of officially branded merchandise with maritime related themes; would promote Operation Phakisa and its education/research providers more convincingly. Students could be encouraged to post You Tube videos over courses, campuses, experiences and achievements, present online blogs.

The future of public relations needs to focus on familiarisation –total immersion in the virtual prior to the real experience, as much as possible. From traditional campus tours to virtual reality headsets and simulations of facilities –i.e. vessels and discoveries, the more candidates are aware of the possibilities, the more attractive it is likely to appear – (whether to investors, to students, to researchers or to the community). Specific apps could be developed. More social data could be scrutinised to consider which are the most and which are the least effective strategies? Podcasting of existing lectures, seminars and events not only assists existing students but can convince candidates that the learning experience and the content; is worth the sacrifice. The media needs to be involved as much as possible. Appointments and plans should be scheduled to seek free publicity and excellent cordial relations from the SABC, eTV, Cape TV, MNET and print media. The private film university should not be neglected –encouraging the cinematographers, directors and producers of the future by offering them favourable access, ideas and support. Live reporting is effective. More events could be officially recorded and made publicly available. Greater attention also needs to consider community engagement as detailed in a later chapter.

As stated elsewhere the conservative attitudes of existing maritime education and its exponents hinder moving forward. This report clasps other aspects of South African culture to publicise our ocean economy from drama and music to dancing, architecture, cuisine, art, photography, film and literature. Customised strategies could recruit small businesses, corporations, NGO’s, religion, professionals and students and improve public relations in these areas, earmarking particular benefits and chances. For public relations and publicity (as with most areas), companies and individuals seek to be persuaded over cost effectiveness, return on investment, direct value/personal relevance and interest; resources on offer…. This ensures the further benefits of networking and industry partnerships. It would be worth examining if corporations will endow specific projects/research areas in result to sincere testimonies of evident accomplishments. It also needs targeting –to lobby Parliament, various political factions, parties and government departments to ensure its advantages are recognised and to procure the investments it requires. Political rallies ensure that regardless of the turmoil; those South Africans who have committed to Operation Phakisa, maritime training and the economy, will be less disturbed. Maritime education needs to be officially recognised by influential parties –as part of the country and beyond petty squabbles. Maritime education needs to be perceived and recognised as a valuable cluster of resources. Gaining access to information and then linking those that have the most immediate and necessary value to you, ensures subsequent direct, updated information can benefit your own strategy and tactics.

PR includes greater maritime sector awareness especially for embryonic scholarship areas. Stakeholders could understand maritime risks, hazards and projected futures including climate change. Open audience debates, guest lecturer seminars and professional panellists/media representatives. Another could film Antarctica, Marion and the Prince Edward Islands. Underwater habitats as sanctuaries, species and shipwrecks could all be filmed/directed. A special maritime asset register could be formed and legally protected so people can start to be aware of their maritime heritage. SAMSA and other law enforcement agencies could be filmed to provide further publicity. Documentaries and documents could focus on Africa’s maritime history. Another could focus on ‘The Role of Durban Port,’ –to South Africa/Africa. Sponsorship and advertising could accompany watersports and yachting especially regatta events. Only by exact policy certainty –in clear documents and actions; can businesses hope to prepare and survive in the short, medium and long term. They, individuals and public communities need clear guidance to prepare, with as much warning as practically possible. PR needs to provide that guidance. It needs to provide enough tangible steps so they know where to focus next.

In this era, help is expected 24/7 and certain companies are offering it –more and more. Others provide video tips; present help tutorials, course, research and staff finders and updated Frequently Asked Questions. One trend to adopt is the one about electronic, live action-based indicators of how long it might take before your call/email is likely to be answered. Increase in online courses and tele-conferencing will reduce the need for a physical rather than virtual presence. One cannot rely on referrals from alumni unless there are specific recruiting efforts such as Alumni Ambassadors. Paid trips offer selectors and envoys to recruit prospective applicants. PR starts with effective orientation –pre-university to each year’s departure and return. It needs integration into all maritime stakeholders and their efforts. However, this should be reviewed to consider that coverage may be insufficient exercise. Radio is not so effective. Nor are leaflets and brochures. If a PR strategy for the maritime sector survives the media litmus paper of dozens of reporters with others voluntarily doing their part to promote consciousness; then it is succeeding.

In this future, retaining attention for Operation Phakisa and maritime education can be challenging. This report emphasises familiarisation of the unusual. Filmed/simulator visits could include an offshore rig, prototype wave energy, aquaculture, port expansions, submarines, Antarctica and climate change. Even an electronic gazette/newssheet/dedicated media TV/radio channel for the maritime sector. A special maritime film festival could be hosted. Professionals could advise on digital effects, music and presentation Careful attention has to consider timing so that news is not overshadowed elsewhere. It is essential to provide a wide range of accomplishments and failures, avoiding perpetual repetition. Those who deserve to be remembered, need to have their credit vouchsafed publicly as soon as possible. It is essential to emphasise the rate of return on investment, to charm the reluctant that taxpayers’ money and support does have tangible outcomes. Community outreach projects present several. Public relations and publicity can demonstrate how key needs and problems could be answered. The more the public are involved to generate support, ideas and test concepts, they more willing they are likely to be. People therefore frequently need to feel involved.

A dedicated Operation Phakisa Foundation could focus on charitable means to provide career development, skills advice, training and funding for the various projects proposed, link people to research and recruit vocal supporters to promote it further across Africa and globally. The most zealous and charismatic could receive committed leadership, organisation, psychology, IT, information and communication skills once their loyalty is affirmed. Youth, students, religion and traditional leaders present good targets to stir up passion. Specialised maritime charities/ NGOs could also be encouraged/founded. This report proposes establishing the equivalent of aquaculture and other extension services, where these do not exist with voluntary faculty and students. The services could conduct field research tests, promote technical knowledge, information, awareness and training. These outcomes include aside from germinating knowledge and contributions, gaining experience, promoting awareness; to counter failure, to rectify and influence affairs to gain support and achieve more resolute decision making. Although far rarer, it could notify the public of problems –i.e. maritime pollution or law enforcement to prompt citizens to volunteer and assist.

There are limits to PR in Africa from population density to geophysical. –One cannot bombast every achievement and broadcast to every individual and company. It is essential though to not just single out the port/maritime area. One strategy could target this area/the coast and another the interior hinterland. However, for it to work, any strategy will need its citizens to at least understand: ‘What Is Operation Phakisa? What are its achievements? What are its goals? What are the risks? What are the opportunities? They need access to the career options, legislation, finance, maritime education and training. Any feedback received from these approaches should equally be studied and forwarded/responsibly probed. Adverse publicity if it cannot be ignored or is trivially simple to resolve, should be countered as soon as it manifests before it festers into unrecognisable cantankerous pus. Any issues need to be investigated, defused or dealt with. One way is to pre-empt critique when embarking upon anything and then seeking to counter it. The second is to respond to an expected/unexpected attack. Scanning the media and contemplating prompt, decisive action, undermines any detractors before they can respond and recover often. With effective awareness and communication, stakeholders are more able to react swiftly, minimising uncertainty, cascading, opportunity, disruption and other costs.

If this globalised world provides myriad sources of free publicity, we as Africans need to exploit this. However, it is advised to retain comments as purely professional. Social media platforms are electronically fiendish to erase –as more than one politician, celebrity and individual has learnt. At least the media are more accountable through libel laws. Less defence against rumour and fake news. The media –who will always be susceptible to flattery or to having the access to public power be rescinded

In addition; social media privately operated has this pervasive tendency to remain far longer than desired in the gaze of public attention if it particularly lurid or sensational…. It all exists there on the Electronic Archive –retrievable at any possible time… The media are preferable to publicise Operation Phakisa as they seek good stories. The best way to address the media is to ignore them for anything problematic. Alternatively, it helps to flatter them so that they will be on your side as stated.

Rather than scrabble about and flounder on any potentially contentious or vexatious occurrence or opinion –it is better to pre –prepare an alternative piece of news that one can use as a potentially distracting topic to discuss. Appoint the young; charming and charismatic to deal with Press; Publicity and Communication in the Chair of Public Understanding for Operation Phakisa Regular panel sessions and occasions inviting them to release the official position can also be a useful source of leverage, if applied correctly. Always have time for the media –be charismatic; courteous and charming; appear candid while silencing details of personal affairs. The media respond favourably to those affable and who genuinely seem interested, interactive and engaging –friendly and willing to answer questions –are organised and punctual –meticulous and concise. Be aware that brevity; interest and deadlines are the three prime and appealing targets that anyone connected to the media seeks so ardently. If one stages visit and interview opportunities with the prominent media sources at any potential event considered ‘newsworthy,’ they will be more favourably inclined –even to mitigate perspectives in the case of more pessimistic news. Grant the media access to certain corridors of power; stage debates and events and they will assist in further cementing Operation Phakisa, maritime education and an economy. Do not worry about some mistake. –It will soon be forgotten provided a sufficient distraction is made to prevent people turning their attention to it. For the deluge of information and events that exist –is so numerous and recurrent, as to not remain in the conscious short-term memories of those aware of it; –even when they bother to take any notice or attention in it at all

The press abhor verbiage… There is nothing like an excess of pure verbal diarrhoea to alienate potential support –but also to obsfusticate certain issues. Concise media statements receive greater attention. –They seldom read the policy implications embedded in the text… and analyse the substance…. –Like most people; who ignore the substance –they worry about sensationalism; broad spectacles; nit picking trivia and pedantry. Active denial of an issue –will only reinforce the opposite opinion on many matters... Most people will consider this as obstinate refusal and will become more and more incredulous –the more you try to protest and swear that something is true (especially when it is…). One has to find an alternative solution. Today’s newspaper –lines the guinea pig and rabbit tray tomorrow –as long as you appear to do something at the time. (People remember apparent stalling with much greater permanence then they do of something positive attempted). Since a news story/headline is brief –as fickle and capricious as many public and the media’s attention, people will soon forget about it, when the media drag up the next thing. Few ever ask retroactively: ‘So what progress has been made on addressing this issue, –since the media first exposed it a certain time frame ago?’

If you really do not want to answer their question use debating tactics –even counteract with another question –polite or less so…. Never be on the media defensive. It is always better to take the initiative –ask them to mention positive highlights or counterattack… All the media desire is stories –and they appreciate those who are efficient and prompt/attentive at giving them... So a useful marketing technique to recollect to publicise any achievements –get them to provide an interview. Or offer to submit an article on your own project/ idea/ achievement –whatever it might be –in creating a new commercial product/ business/ in pursuing a dissertation or market research/ other based survey requiring some form of public input. It is best to take the media and other sources of publicity seriously and follow several of the suggestions embodied here and elsewhere in a way to charm them. Actually -or appearing to listen and value input is the highest form of flattery –whether to the media or others. Besides; it provides complimentary publicity and a more sympathetic media coverage/ treatment of your policy perspective/ position etc... If one disarms them by apparent translucency; candour and willingness to cooperate; they will be less inclined to be scathing and hostile to you and your policies –particularly when you take great pains to consult them (or appear to); to host regular interactive briefings and events with the media and by flattering them.

## CHAPTER 19: LECTURES AND SEMINARS

The point of lectures and seminars is to familiarise non-specialist people with essential information, in a short, defined period of time such that it engages their interest and they are capable of retaining as much of it as possible. The idea is to prompt them to follow up and pursue more out of need/interest. This chapter recognises the valuable contribution that lectures and seminars can play for maritime education. It identifies various characteristics in which these can further ensure the reality and success of Operation Phakisa and an African maritime economy. For Operation Phakisa lectures and seminars can serve myriad purposes. Primarily they exist as sources to disseminate knowledge, research, discoveries, insight and experience. They seek to enlighten receivers on a range of topics. Lectures and seminars can be distinguished between those that serve as part of a regular maritime education qualification and curriculum; those more internally based, (which are presented to others of a department/university on a specific topic) and open lectures –those accessible to the greater public.

Seminars in contrast can serve as more informal gatherings, in smaller venues. They can involve an audience and speaker/panels but also allow for more open debates or panel discussions. They are often prescribed for undergraduate students to answer coursework assigned questions or postgraduates/faculty to share, present, analyse and debate research. These are often more regularly scheduled, attracting mostly those of similar interests rather than a larger audience. For maritime education to be more effective, this report proposes greater usage of not just simulators but hosting seminars outside, in different maritime environments and backgrounds including coasts, marine reserves and vessels. This presents practical experience and the capacity to think/react under more real conditions, where it is more needed.

For both seminars and lectures to work effectively; it frequently involves significant and organisational effort –that have to be maintained. The venue needs sufficiently suitable sound/acoustics, lighting, sufficient seating and desk/table rows, heating/ventilation, a projector, computer, Internet access and other appropriate technology. It could offer students the chance to present research project posters. The maximum attention of students without a break is around 50-60 minutes. For lectures it can extend to 1.5-2 hours at most. However, it requires a diversity of topics, sufficiently shuffled to attract both regular and new participants. It requires regular updates for coordinated information and communication –not just a once off… People need advanced notification –as early as possible –distributed across multiple channels –from social media to emails, newsletters and posters. Although RSVP requirements can assist in catering and arranging venues, expect more to simply turn up without formal registration. Providing people with the speaker’s contact details and a chance to sign up to a regular mailing list assists this. Those who only turn up for the event itself at last minute notice; might appreciate this more.

Provided the presenters are willing, lecturers and seminars should be made electronically available and broadcast via podcasting wherever possible so others can benefit when unable to make it. A disclaimer could be provided about confidentiality, represent only interim conclusions or if seeking permission to transcribe lectures and their material –record, register copyright and distribute. The host institution/department etc could invite volunteers –especially expert specialists. Another purpose of lectures and seminars therefore exists to gain insight by pre-invite and select guest speakers. This can flatter particular core contacts, further increasing funding potential or networking opportunities. It provides a means of thanking those whose support has been particularly generous. It offers industry/others a chance to publicise their contributions, achievements and insights to those whom might be interested and can most benefit from it. This report advises presenting any invited speaker with a small gift as a token of thanks, hosting photographs – (if with their permission). Perhaps invite them to a meal afterward/offering to help reimburse travel expenses, out of courtesy. Successful events consider a period for refreshments, one for networking and one for raising questions –with sufficient time. They are best scheduled in the early evening –around 5-8 pm or 12-2 pm around lunch time, –when the majority of people are more likely to be available. Particularly in South Africa, it is cautioned to be prepared. For example technology failure, power cuts, strikes, protests, delays and non-turning up, need to consider contingency plans.

Lecturers and seminars therefore offer a chance for publicity and networking. It can facilitate Operation Phakisa by concentrating on core areas of research, achievements, concepts and experience. It can fertilise knowledge across often isolated sectors and stakeholders and engage outsiders, traditionally separate from the rate, direction and existence of scholarship. Aside from offering students and faculty the chance to present discuss and contribute research including random debates, they can be accessible to all. They could allow the academic community and society an open platform to raise any issue which is felt to be worth sharing. My Australian university and PHD experience crucially ignored the core insights, experience and knowledge that its cohort of postgraduate students had acquired. Even when I volunteered to present my expertise in other fields; the university was pointedly not interested and utterly discouraging. We got to present our thesis findings 10 -15 minutes’ worth; once per year –as a requirement for a review of progress. People were only notified on the day itself –with predictably low turnouts and chances for audience participation restricted to five minutes. This is one experience that we as Africans can learn from. In designing the maritime education centres to serve the forthcoming African century, we can choose not to ignore the experience of faculty and students beyond merely the degree or research currently pursued. We can illuminate other areas to avoid being completely wasted resources. Enough venues exist –all it needs is the chance for publicity and people can voluntarily elect to pitch up.

Although each seminar convenor has their individual style; the point of seminars should be to encourage relevant and stimulating debate. It should be to actively invite participation and avoid normally boring silence –the tedium of clueless, apathetic, semi-conscious undergraduates. However, this can be challenging –individuals might need to be singled out. Tutorial leaders need to consider regular non-participants carefully –after all investing in maritime education is expensive and reflects significant opportunity costs. The aim should be to avoid dominance by simply a few. With both lectures and seminars, it helps to record and ensure presentations are electronically available –but allowing for a time lag so as to encourage students to turn up. Alternatively, despite higher risks they could be placed in advance. The point is to ensure that students can have knowledge infiltrate them eventually to maximise higher chances of success. This report proposes various incentives to encourage participation. At my UK university, 5% of the coursework mark was based on seminar/lecture attendance and participation. 5% was based on completion and timely submission of the work. Students could vote on Teaching/Seminar leader awards. This could encourage certain faculty and postgraduates to improve performance. Each course could receive invitations to end of semester feedback and evaluation forms, anonymously surveyed. Feedback provided could be acted upon –and mentioned in follow up emails/sessions. This allows the course to be independently monitored. Additionally, random students/staff could be encouraged undercover to assess the quality, presentation style, substance, crowd control and other factors of delivered seminars and lectures.

Lectures and seminars can serve to avert the loss of knowledge and gain from failure –especially if electronically archived and distributed. It provides valuable presentation experience for the speaker; the chance to gain constructive feedback and modify affairs appropriately. It might also enable the chance to gain recruitment, networking, funding, events or research awareness and other opportunities. More significantly, it allows research to matter in reality! It empowers it to have greater impetus than confined to an obscure journal or dusty shelf or remote Internet search, consulted and cited by (at most) a handful of truly dedicated academics. It publicises research to those who might be able to gain from it. This helps others who might otherwise be totally clueless about it, despite the gargantuan potential. Presenting openly allows the chance for debates and further development. It may lead to influencing the public, media, business, government policy, research or any manner of unexpected outcome. Given the exceedingly low probability that even quite illustrious academics can face in formal academic publishing; it can really advance knowledge.

The principle is to recognise that virtually any insight is to be treasured and may be of use to someone, in the most unexpected of ways. Anyone may also offer it –it should not be silenced. International partnerships could be formed by offering speakers guest lectureship chances. The inexperienced should be encouraged to undertake rehearsals –especially novice students who could learn from effective speaking and presentation skills. Another opportunity offered by lectures and seminars for African maritime education is that they can be compiled into textbooks or volumes –to assist generations of students. Local case studies and experience can be assigned and recorded as research projects and exams/tests. Anything of direct, local interest could assist far more than dependency upon foreign material. Past tests and exam papers could also be electronically provided for practise –certain lectures could assist students by granting them the chance to go through several – (time permitting). It ensures they are not just submerged. It provides chances for laboratory projects, field research, theories, risks, failures, research discoveries and opportunities.

The future of lectures and seminars could endorse digital innovation far more. It allows for greater virtual/electronic presences so that via Skype and other means; the entire process could be online –separating the speaker from the audience. Greater use of holograms and 3D models could complement this or aid the speaker in presentation. More interactive audience participation with effects, displays and a backdrop could be considered. These techniques could allow for greater flexibility and even economise from a logistics perspective. The implications are that even the most distinguished foreign academics or CEO’s could participate in lectures to our African maritime institutions and stakeholders. To persuade these renowned, hypothetical speakers this report consoles extending personally couriered invitations with official elegant stationery, to stimulate a reaction. Consider what time period, date, location and other details are best for the speaker. Invite them to bring a copy of any books/souvenirs etc. Mention copies of their research etc in any advanced abstract that is circulated to encourage background familiarisation and ensure sufficient biographical detail is conveyed to the audience during the introduction. Allow reasonable timing for the presenter –including for audience questions, of which there are bound to be many but consider speaker availability, networking and refreshments. Consider security access if needed. Afterwards, it is courteous to send both an official and a personal message of thanks.

Official lectures could be established, depending on sponsorship and resources available –on specific maritime topics/research areas. For example, Maritime Risks or ‘The Future of Maritime Education and Training”, “The Future of Maritime Research”; “The Future of Ports, Shipping and Supply Chains”; “Opportunities of Operation Phakisa,” “Employability Skills and Vocational Guidance.” This could be specifically aligned and connected to Operation Phakisa. The extent to which these should be publicly broadcast, given confidentiality should be examined based on speaker preferences. The problem is, once disseminated –it cannot be easily retracted as it morphs into semi-public ownership. University/college societies, local media, NGO’s, academics, businesses and professional associations could all be invited to open lectures with sufficient notification. Seminars and lectures aim to rapidly provide awareness and insight without overwhelming technical detail. It can also provide a form of flattery and recognition of sincere interest that a person’s efforts matter so much they deserve a wider, more receptive audience. Hosting seminars and lectures is advised not just for introducing innovation in research but also to persuade and motivate others when proposing a new project, funding application; facility, course or qualification. Peer review and pre-testing concepts can refine them further.

This report also proposes these as means of assuring the quality of teaching. It proposes these form a basic recruitment technique. From a temporary casual postgraduate or guest lecturer position up to the Vice Chancellor or dean; it should be a mandatory requirement to host an individual, peer reviewed lecture, a seminar and an open lecture to assess the calibre of the applicant on a topic of their choice. They can be evaluated for style, content, psychology, teaching capacity, crowd control and other factors. CV qualifications and theory are no substitute for actual experience. The aim would be to virtually test them before they were released into actual conditions. All lectures and seminars would be electronically accessible on internal systems i.e. Moodle –and assignments submittable through this process. They could be held on Open Days and other formal occasions with the chance for debates. Finally lectures and seminars offer a chance to support awareness of Operation Phakisa. It can create or renew greater support, passion, interest and commitment to investing in maritime education and a maritime economy future for Africa. It creates the chance for academia to transform into reality, with tangible evidence of assisting stakeholders. It can provide maximum publicity and public relations if skilfully executed. It empowers it to mean something more personal to the engaged, connected audience. It provides networking exposure.

## CHAPTER 20: CURRENT AND FUTURE RESEARCH AREAS

To be a truly significant maritime scholarship nation, our education providers need to pioneer the current and future research areas outlined in Chapter 3. This chapter analyses the official South African, academic response to Operation Phakisa. SAIMI and CSIR have recently published their version of a Research and Innovation and Knowledge Management, Road Map for the South African Maritime Sector up to 2030. The Road Map embodies the following 8 principles as the future of maritime research. SAIMI recently hired its first graduate Research Associate –in maritime law to assist. However, the Road Map and existing policy documents specifically ignore the implications of potential foreign competitors and strategic allies on our own future. This chapter identifies current and future research areas that have been officially targeted across the other 2 African maritime universities, Australia, Ireland and the European Union. This provides an indication of where South Africa’s current and future research aligns globally and sustainably.

**1. We have a maritime culture and recognise and learn from our maritime history.  
2. We have an enabling governance framework for the maritime sector.  
3. We have an efficient system of coordination, collaboration and knowledge sharing and have taken measures to reduce red tape in order to promote investment and development.  
4. We utilise our resources sustainably and protect our natural resources in the EEZ (exclusive economic zone).  
5. We have a research, innovation and knowledge management system that is relevant, well-functioning, targeted and multi-disciplinary.  
6. We have structured financing of initiatives in the sector and sustained maritime economic growth.  
7. We prioritise safety and security and military protection within and beyond our EEZ.  
8. We have national, regional and international presence and recognition.**

The road map indicates the desired state, the current state and future specific actions necessary to attain the most optimal outcome. This includes selective research, training and facilities as identified through stakeholder consultation. For point 1, this report observed the majority of South Africans are and have been land orientated. It recognises the gaps in local institutional capacity and research. In response it advocated introducing specific courses in maritime archaeology, art/culture, history, maritime risks, hazards and failures along with ocean popular understanding. For point 2/4, it identifies existing research gaps could be resolved by introducing its emergent research/qualifications in aquatic security, revised maritime law and diplomacy, maritime law enforcement, maritime security; maritime risks, hazards and failures plus uncertainty with maritime futures. The road map established the lack of a South African maritime industrial policy and the need to provide an Ocean’s Act/critically appraise existing maritime policies and legislation. Point 4 would be further supported by reforming existing areas but also a new course in marine contact. Point 5 would be addressed through piloting a new research area in maritime education, human factors, maritime philosophy, maritime psychology and technology. For point 6, this report proposes a new research area specialising in maritime finance as in Chapter 3.

The existing road map does not indicate the specific courses, resources or institutional capacity necessary to achieve any of the points. In response to point 7, this chapter presents courses in maritime communication, maritime law, maritime law enforcement, security, psychology, technology, warfare, submarines and human factors. Point 5 ignores other opportunities for a marine knowledge-based economy for the space/marine economy, maritime cuisine/vocational craft, maritime business and administration, ocean renewable energy, port pricing and maritime sports research along with existing subjects. It mentions the need for international collaboration and partnerships but specifically ignores foreign research, education providers, funding, conferences and other opportunities detailed in this report. A local, September 2017 conference indicates the future of maritime research includes technologies for future ships and shipping. It included Virtual Reality ergonomics, autonomous technology, digitalisation, cloud based numerical towing tanks, drones and future anti-fouling.

Our continent’s and nation’s decision to embrace the blue economy as part of AIMS and Operation Phakisa is challenged given only 3 maritime research nations exist in Africa. South Africa’s potential and existing institutional capacity has been outlined in this report. However, this report proposes considering Ghana and Egypt’s existing and future, maritime research projects to determine whether our academics, industry, governments and communities can view them as competitors? Or should we form collaborative partnerships? Neither has a formal maritime research strategy equivalent to South Africa’s Road Map nor integrated into mainstream government policy and legislation. Ghana Regional Maritime University research are currently funding a prototype Solar and Wind Operated Ship, a Ghana national maritime policy and waterborne freight transport analysis. It is examining maritime oil exploration potential, urban water transport between Tema and Accra and ocean renewable energy through ocean thermal conversion for power shortages. It is proposing improvements to small vessel design and emissions reduction approaches. The Arab Academy for Science, Technology and Maritime Transport in Egypt are not focusing on maritime specific issues but generic transport. It is focusing on cyber-physical systems for manufacturing, hybrid fuel power generation, a local electronics industry innovation cluster and a more efficient shoreline clean-up process. It is promoting transport entrepreneurship, technology transfer, food security, nano science, green energy, marine science, highway and traffic engineering.

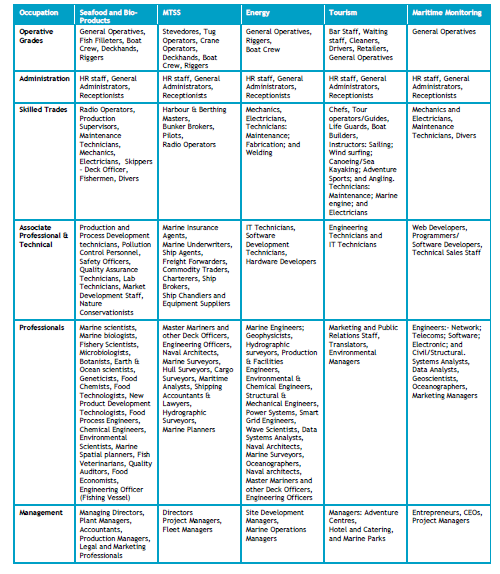
One of the most crucial limitations of South Africa’s existing road map is that it ignores other nation’s and areas’ parallel dedication to pursue, advance and exploit the maritime knowledge sector. Others also are committed to forming a maritime economy, although few have specifically established a clear maritime research and education vision. The European Commission in a 2010 report proposed a ***‘Green Paper Marine Knowledge 2020: From seabed mapping to ocean forecasting’***. It recognises that industry, public authority, scientists and communities each have different requirements and factors which they can contribute. Its priorities include climate change adaptation, environmental reporting, a unified direct database for fisheries management, a GMES Marine Service and a European Marine Observation and Data Network (EMODNET). Its first priority creates a digital seabed map to improve sustainable resource management, maritime security, risk management and ocean governance. It is improving marine structure and vessel design, especially for vulnerable infrastructure. One core constraint it has noted for existing research is the fragmentation of data across multiple stakeholders, duplicating resources unnecessarily. The report estimated a minimum of 300 million Euros would be saved. It is therefore concentrating on connecting all in a coordinated network and database. The GMES Marine Service similarly links marine satellite data. The European Commission is also working on private sector agreements, partnerships and incentives to release more of its separately funded/established research data.

Australia’s maritime research future is outlined in a paper entitled ‘***Marine Nation 2025: -Marine Science To Support A Blue Economy.”*** Unlike the South African Road Map it has concentrated on identifying and reviewing its existing marine infrastructure, economic contribution to its ‘real estate’ and research capacity including stations, vessels, data systems and experimental facilities. For the future, it subsequently proposes a Decadal Plan for Marine Science and a National Marine Science Steering Committee. Section 2.1 concentrates on maritime sovereignty, safety and security. It focuses on risks, accidents, threats, understanding oceanographic phenomena and greater sustainable resource management/governance using improved sensors and other techniques. Section 2.2 prioritises energy security. It especially singles out gas exploration and clean energy conversion using ocean thermal energy. It proposes investigating offshore sites for carbon dioxide emissions capture and storage. Section 2.3 highlights the need to research maritime food security including cost-effective aquaculture, radically reducing wild fishmeal pressures. Climate change requires further attention. Future research is proposed in temperate water to compliment Queensland sub-tropical water. Section 2.4 focuses on biodiversity conservation and ecosystem health with resource mapping, coordination, planning and evaluation. Section 2.5 specifically concentrates on climate change. Section 2.6 directs research towards optimal resource allocation and information sharing. The overall strategy calls for academia to prioritise new and improved data, tools and skills. Australia has invested in an Integrated Marine Observing System and online Ocean Data Network for all three surrounding oceans since 2009. It is proposing improvements to its marine science training programmes including preparing graduates to have greater familiarisation with social, economic and communication factors.

An Australian defence paper on ‘***Maritime Science and Technology’*** focuses on maritime research designed to improve Decision Superiority; Mission Survivability in a High Threat Environment, Joint and Combined Operations; Creating and Shaping the Future Force and a Seaworthy and Airworthy Fleet. Its maritime security, risk management and warfare themes probe information integration and interoperability coordinating all armed forces, space, intelligence agencies and electronic/cybersecurity. It focuses on the roles of science and technology in developing robust and protected networks and infrastructure; task group operations, anti-submarine warfare, integrated air and missile defences along with enhancing current capacity in mission systems. It is focusing on autonomous systems and technology, sensors, command and control systems plus amphibious warfare operations.

Finally, the Irish government are also focusing on directing maritime research and education. They commissioned the Expert Group on Future Skills Needs 2015 to undertake **‘*A Study of the Current and Future Skills Requirements of the Marine/Maritime Economy to 2020.’*** It has identified skills and employment opportunities in five key areas: seafood and bio-products; maritime transport, shipbuilding and services; oil and renewable energy; tourism and maritime monitoring, security and surveillance. The seafood and bio-products sector targets sea fisheries, aquaculture, seafood processing and marine biotechnology. Maritime Transport, Shipbuilding and Services also focuses on marine retail service, construction, manufacturing, engineering, marine commerce and ship leasing. It contacted core stakeholders via surveys and interviews to establish the core skills and other requirements demanded. It produced the following Table 20.1 identified employment opportunities, each of which requires training capacity to be developed.

Table 20.1: Irish Maritime Economy Identified Employment Opportunities



Its core findings was the value of transferable skills to other economic sectors, even if direct maritime jobs are not immediately provided. It identified the need for increased IT services and practical experience to be integrated. In particular it engrossed itself on the role of maritime education in ‘marinisation’ where additional marine specific courses/training/experience can overcome existing scarce maritime skills for those trained in other areas –i.e. business, economics, law, medicine, science, technology, IT and engineering. It proposes an updated marine economy database, continuous skills assessment, a ‘Marine Discover program’ to increase awareness among students and the community, a seafood industry mentorship program and a data collection and biological sampling course for fishermen.

To conclude on current and future research areas, a paper on ‘**Global Maritime Trends in 2030’** proposes future maritime research concentrates on the implications of future maritime powers. I.e. what will be the implications for South Africa/Africa’s maritime policy, governance, education sector and economy if the US continue to dominate maritime security but China has significantly expanded control of global maritime and other economic resources, shipping, port, trade and logistics ownership? It could consider changes in technological progress, competition, demography, supply, demand, climate and fleets as implications for maritime research. A paper on the future of marine structures and universities has extended the role of universities to include vessels, offshore installations, energy generators, ports, breakwaters and other structures, improving design, performance, capacity, training and maintenance. It proposes improved materials and analysis tools/software and elevating maritime technology into traditional curricula.

## CHAPTER 21: COMMUNITY ENGAGEMENT

Maritime education in Africa has to serve myriad tasks. Although the global higher education sector has engaged with individuals and local communities; most have seldom devised a formal strategy approach that determines what specifically communities can expect from them. Equivalently, comparatively few have set out a formal vision and structure as to how they can maximise the benefits of community engagement, from an institutional perspective. This chapter considers how the future of maritime education through its coordinating institutions, service providers, stakeholders and research plans can serve community stakeholders and themselves mutually. This provides a further mechanism to ensure Operation Phakisa and the South African maritime economy become a sustainable future, beyond policy makers and academics.

Therefore, our maritime colleges and universities need a clear vision which maximises the value of their output and benefits to communities. They can serve to facilitate passion and interest in their achievements as well as those that advance Operation Phakisa. A crystalline vision for community engagement would include guidance –support –service -consultation -participation –enthused action… gaining from their insight and experience. Multiple reasons exist to interact with communities rather than only dedicating efforts to networking with business, government, researchers and funders. They too can offer similar networking advantages. They present a trove of potential knowledge, skill, experience and insight to contribute. They can present sources of publicity and improve reputation, broadcasting attainments –in research, activities, teaching, funding, society and elsewhere. Greater awareness of triumphs can mobilise more durable and credibly popular support for any activity or decision, undertaken or proposed. They can argue against funding cuts, strikes and protests or in favour of specific projects or policy decisions, if they feel they have a more personal stake in the campus’s fate. The more vocal and numerous the audience, the more influential they will be than just academics, administrators, students and support staff alone…

Therefore, this path for community engagement can seek to make use of them when willing. For example, gaining insight into their practical experience, common sense or capacities can assist projects and other maritime research output. They can help establish and sustain pilot projects. They can stimulate demand for anything produced –both initial and under full commercialisation. They can also contribute through other report sections mentioned –in generating ideas/Intellectual property and other output. Our campuses can become more popular, if individuals realise they are not alone… If they have something to share or contribute, the maritime campuses can personally assist them to make it happen. It helps them to feel personal and civic pride. Equally it reassures any researchers or students that benefit. It provides confidence to university parties, their efforts really can make a difference in reality –even as they struggle to obtain results, funding, support, praise or accepted publishing output. Tangible results and actual project experience can assist stakeholders if they are conscious of them, even when it appears a thankless task from unappreciative fellow peers.

For the 21st century with turmoil, limited resources and budget cuts affecting the local and global research sector; community engagement offers the new path of crowdsourcing and crowdfunding –providing new opportunities that are not so restricted or competitive. It provides research exposure leading to far more prospects and possibilities than the remote chances of being accepted, published and cited in a ‘high impact’ factor journal. With sufficient warning, this engagement promotes awareness of maritime developments, allowing people to plan their careers, lives, leisure, consumption and other decisions accordingly. Academics can also learn what works along with the need for changes, mistakes and failures… One never knows just what a random audience member may innocuously raise as a concern. It provides options to verify tests and showcase projects, refining them to be more acceptable to a wider audience. It can also inspire and ignite passion in a maritime destiny future, installing pride and change. The more people become aware of experiences, accomplishments, opportunities and means to counter risks, the more they are likely to modify actions, decisions and behaviour in a more constructive way. People can address challenges far more, if our academics and administrators can concretely demonstrate victorious or at least more certain pathways. It can consider whether specific research and other contributions should be restricted; –or circulated on a more expansive scale.

Other chapters have identified effective means and processes of communication and information, which can engage communities. They can be approached as audiences for lectures and seminars by invited speakers. They can participate through formal projects, conferences and events –including Open Days. They could test simulators and see facilities/ displays of training etc. School visits could enthuse younger generations. They can participate in societies, extra-curricular events including sports and games, courses, workshops, field research or social networking. Offering campus tours and exhibitions of work provides further chances to familiarise and impress them with the forefront of African maritime knowledge. Local communities could receive not only specific projects to aid them but also devoted scholarships and bursaries to promote greater ties throughout generations. They can share in campus facilities –hiring them out. Local religious and community leaders could be personally contacted and encouraged. Local faculty, students and staff members could solidify connections further through not only international maritime occasions such as Day of the Seafarer but also add maritime themes to our public holidays. They could volunteer for 67 minutes on Mandela Day, celebrate Youth Day, Women’s Day, Day of Reconciliation, Worker’s Day and Freedom Day.

They could be involved in fund raising activities and any other event designed to promote our maritime academies, universities, facilities and their people. This would assist Alumni and other ambassadors. This report proposes the formation of a specific Community Engagement Office, support staff and a senior director/dean/pro-Vice Chancellor equivalent where these do not exist. It proposes the extension of the campus Listening Service concept to the public –so that they might be able to share their ideas and perspectives more constructively. Our maritime academics provide more qualified channels to link people with the most productive output, if the most crucial concepts are filtered through to them. Traditional engagement involved the researcher taking the initiative and having to formally apply for rigorous ethics, formal contracts and other bureaucratic procedures. Or it involved the limited time of 1-2 questions in a brief lecture or seminar. However, our maritime sector lacking the resources and time of the developed world; needs to upgrade our techniques for the 21st century. This involves allowing for greater diffusion and exchange of ideas, greater contact; awareness and exposure and more sophisticated usages of social media and other technologies. It requires digital interfaces being regularly updated so news does not become stale or of less value. For example, websites, newsletters and other forums need to be updated as soon as possible –even daily or hourly. This report proposes creating specific online maritime communities –including researcher networks for more instantaneous contact. Community forums could be formed to exchange stories, ideas, experience, support, information and other resources.

The community could suggest maritime related courses that it would be willing to pay for –local classes or even practical training in maritime sports, art, cuisine and culture. They could provide volunteers to aid field research students and academic investigators. They could really assist in data collection, observation recordings and surveys. It reduces asymmetrical information and adverse outcomes such as a low participation rate. Anything that promotes trust and support should be endorsed. Equally those on campus could be encouraged to volunteer for civic/local issues –to feel more integrated. Local charities could be officially endorsed. The campus could follow the example of Australia’s Good Neighbourhood Councils and policies. For example certain universities host a free Community Welcome Dinner where students, staff and local community members meet to kindle social connections –each brings a plate of food/drinks etc, explains their dish and shares. Community contact and support can promote relationships but also inspire them to favour new maritime products, technology and research, especially for those unfamiliar with the university/college/laboratory and its potential. These places can advise communities on their vocational pathways. They provide credible information sources rather than depending upon ‘fake news’ and the unfiltered deluge of information swamping the Internet and elsewhere.

University Engagement Awards could reward those in the community that have contributed the most to the University –in engagement, ideas, in support, funding, resources, talent or otherwise. Equivalent Civic Engagement awards could be granted to faculty, students and other staff members who have performed similarly well to advantage and connect with society. Other prizes, competitions and debates could be created to reward effort and foster ambition. Graduation ceremonies could involve more of a city procession and involvement; –a Town and Gown occasion as practised in Europe, the Ivy League USA and Australia. The course of Ocean Popular Understanding and others proposed would further acquaint the community with the need for specialised maritime centres of learning, emphasising how it can advantage them.

Throughout this process it is essential that our students and staff are trained and encouraged to value community collaboration, contact, partnerships and interest. They can recognise the most effective means to communicate their ideas and requirements. It is essential that they can articulate the core essentials so that it can be understood by a non-technical/specialist audience. They need to value the potential for knowledge and other valuable contributions of the public detailed in this chapter. It can be sobering –yet vital to register that knowledge does not only exist purely for its own sake. It often needs to be a means to a pragmatic end. As previously mentioned, one measure of gauging a prospective applicant or recruitment source is to mandate they deliver a public presentation. We in Africa specifically require African solutions to African problems. Therefore local research could emphasise local case studies and experiences, topics of significance and policies. It could indicate appropriate risks, costs, advantages, opportunities, weaknesses, challenges, constraints and threats.

Academia will represent the fulcrum through which many stakeholders become aware of Operation Phakisa, African maritime education’s possibilities and the prospects of a maritime economy. It can really influence their decision and capacity to assimilate and participate. It affects their resilience and dependency. Therefore, those of us with the potential to shape and energise them, should not squander it recklessly. They need pointers into the information that can most assist them to be prolific. They need to be hoisted out of apathetic complacency and inertia, energised and passionate. Increasing awareness means embracing all South Africans and Africans –even in the remotest areas, 1000 kilometres from the Ocean, they need to understand why we have invested so much in our maritime future. They need to grasp how the knowledge, resources and options do not confine themselves to the shoreline but extend throughout society, education, the environment and economy. It helps to feel personally committed and understand the pathways chosen by your nations.

This report advises that the maritime education sector therefore devise strategies to encourage maximum but also the most productive means of community engagement. Given our history and tensions when parties feel excluded, it is essential to negotiate and discuss with communities their ideas on this process –how each can profit the other and jointly. Even with limited resources from online communities to regular newsletters, to document and research updates, to public notification of events to devoted road trips and exhibitions; it is possible to connect and publicise. Students could be assigned local projects and case studies to enhance interest and value. Additionally, research could have practical results. Students could devise local maritime technology, security, engineering, health or other solutions. They could be encouraged to form a local business –with community members i.e. in aquaculture for seafood, applying theory to practise. The students and the community would ultimately gain further sources of income and employment. This formally attaches the maritime education sector to the actual maritime economy as a sustainable legacy. The community could advise on local conditions and means to enhance efficiency, security, productivity, sustainability and other requirements.

Without engagement, how else would the million jobs by 2033 be produced by those who historically have not favoured the ocean economy and continue to be reluctant despite multiple government incentives? One cannot just rely on industry to create these from scratch or expect the government to sponsor all initiatives using taxpayer’s money. Yet this is conspicuously absent from our Maritime Research Roadmap in Chapter 20. Engagement is proposed as the future of more than just employment creation for our colleges and universities. It can assist stakeholders to be more aware, informed and prepared, prior to proposing any changes in government policy, new projects, directions in research, projects or funding. Above all else, our own maritime sector remains notably hampered by scarce skills, experience and other constraints. In 2016 SAIMI have just appointed their first Research Associate –in maritime law. However, the SA Maritime Research Road Map and this report each propose hundreds of concepts to research. Hence the need for those of us with insight, experience and qualifications to most efficiently disseminate to those not so maritime orientated.

Although maritime education proponents can provide information and assist but the truth is that many including policy makers propose ideas and produce research output that does not convert into actual new concepts and sustainable employment. It is one thing to propose a concept –another to implement it. Our maritime sector needs to funnel information more constructively including listing stakeholder contacts, funding, options and skills advice. Parallel courses are also necessary –not just in ocean popular understanding and ‘marinisation.’ Other skills required include information and technology, intellectual property/related law; financial and maritime ecological literacy, languages, funding proposals, formulating business plans and reports along with general vocational guidance and employability skills. Support cannot be just once off –but a continuous investment process if it is to become permanent. Existing enterprises cannot be ignored either, when and where they can gain. Our research and achievements also need to be assessed to see if they are working, or actually benefitting the public at all as one of its preferable outcomes.

If community engagement did not occur, how would the individual, the research, society, the producer or the institution lose or benefit? Direct engagement on commercialisable products, skills development or employment options can actually stimulate their existence. For communities to be able to plan –they need to be aware as soon as possible. Interaction has to act synergistically to maximise mutual benefits whilst reducing risks and impact costs of uncertainty. Community engagement for the maritime sector cannot just be a once off event –i.e. a SAMIC Conference held every 3 years but a regular occurrence. Regular information, opportunities, research updates, achievements and events need to be regularly released and communicated. Above all else it helps to avoid the campus fortress mentality and other problems that we experience in South Africa. Our security concerns turn our campuses into prisons where visitors are harassed and officially meant to fill in paperwork/specific reasons. Local residents distrust the value of students to the local economy, complaining only of externality costs. Strikes and protests continue to undermine trust and productivity further. The chaos that has engulfed South African and world higher education does not promote a productive, conducive, empathetic environment. This report proposes efforts at community engagement can provide a start at reducing this mistrust, animosity, exclusion and isolation.

## CHAPTER 22: MARITIME EDUCATION, ECONOMIC AND OTHER OPPORTUNITIES

Of all African countries pledged to the fulfilment of the AIMS vision of an indigenous ocean economy future, South Africa is not only the most aptly equipped but perhaps the only one to plan how it can actually materialise. However, this chapter considers maritime research and education could benefit from opportunities other than those already stated in the Maritime Research Road Map, SAMIC 2017 Conference, SAIMI website and various government websites/policy documents. This report advocates maritime research specifically concentrates on certain curriculum areas advanced in Chapter Three. However, it also needs integration with existing projects to develop further employment and other benefits. It therefore outlines additional local and regional, African, maritime economic opportunities for stakeholders to capitalise on. Several derive from AIMS, are outlined later in this chapter.

Potential exists in consultancies, partnerships, research access, technical knowledge and skill, experience; institutional capacity, teaching, commercialisation, resources and stakeholder requirements. From Table 2’s emergent research areas; aquaculture beyond South Africa has tremendous opportunities for research, investment and employment. This report proposes our researchers could consider each species’ properties to assess if they represent profit, a threat or otherwise are preserving –extending parks if necessary. We could either introduce commercialisable species, form partnerships, training or invest in other aquaculture projects across Africa from Lake Malawi to the Mediterranean. We could train maritime vets, biologists, technicians, businesses, providers of fish feed, specialised equipment, construction, researchers and stakeholders. Professional associations could present further expertise. SARNISSA, our aquaculture facilities and others could align with the Pan Fish and Fisheries Association, the Aquaculture Network for Africa, WIOMSA and others over courses/laboratory. More research could investigate not just seafood but seaweed, marine oil, value added products including cosmetics, pharmaceuticals, jewellery, crafts and others. Existing institutions favour funding field projects and stakeholder awareness/consultation workshops over yet more research with minimal practical output. They offer smallholder grants $5000-$50,000. Our locals need to exploit microfinance options. Our academies can ensure their ideas are technically feasible, manage risk, eco-sustainable and commercially viable.

Resource surveying, water conservation, improved filtration, irrigation, drought management, engineering, sanitation and plumbing provide aquatic security opportunities. From protecting Lake Victoria, the Nile, the Congo and others to Eskom’s involvement in the giant Congo hydroelectric scheme, water security presents the greatest risk of climate change for Africa. Our specialised facilities and firms can ensure South Africa leads Africa rather than a foreign consultant. Climate change implications for resource security, technology, health, agriculture –resistant crops, aquaculture offers more consultancy, product and service investment chances across the continent. It could invest in natural capital including marine sanctuaries across Africa. Our maritime education providers and businesses could focus on expanding cruise, marine and ecotourism beyond our borders. Existing leading aquariums –Bayworld, Two Oceans and UShaka could create subsidiaries and marine reserves. Water theme and amusement parks offer marine leisure options. A significant market gap arises from a lack of indigenous African cruise ships/cruise lines, specialised crew training and related research. Eco sustainable, tropical beach resorts exist along the East African coastline and archipelagos but are noticeably conspicuous along South Africa’s north KZN coast, Mozambique, Tanzania and Africa’s west coast. The equivalent of Sol Kerzner’s popular resorts in the Bahamas, Dubai and Sun City could be formed. Local tourism submarines could be formed near decent dive sites/wrecks along our East Indian Ocean coastline. South Africa could fabricate and repair these.

Our space economy, satellite and engineering companies could further concentrate on maritime applications across Africa. Along with our expertise in general security and IT, we could provide enhanced maritime security to African nations lacking equivalents. As Africans, we should dominate our maritime communications market. We could apply it to mobile phones, design port and vessel traffic management systems, localised seafarer and navigation simulators and coastal surveys. Our satellites could provide passing vessel Internet, radio, VSAT and other communication/information requirements. More vessels, increased automation and electronic information submission requirements will generate more demand –especially for personal Internet. South Africa’s expertise in customs modernisation could offer similar software, technology, manuals and training to SADCC and others to simultaneously facilitate trade and security.

Our global expertise in Maritime Law and Diplomacy could promote Cape Town or Durban as a High African Admiralty Court equivalent rather than London. Disputes could be centred there, providing specialised training and supporting lawyers, given the presence of MLASA. Equivalently opportunities abound for maritime law enforcement, navy and coastguard training. SAMSA could improve other African maritime safety aspects commercially. Maritime Security would also benefit –could even establish private security firms, adapting equipment, technology and training for risk management. South Africa could create specialised maritime finance companies including ship broking, chartering, insurance, banking and a stock exchange. The demands of AIMS for cabotage, port expansions and other opportunities have ignored the gap of conventional institutions to finance a maritime economy legacy.

Aside from finance, South Africa is the most qualified to provide seafarer crew training, construct, repair, salvaging and demolish vessels. Although only a few, at least we possess specialised marine engineers, surveyors, maritime lawyers and naval architects unlike many African nations. We also possess divers and underwater photography experts that could investigate African markets for branch office expansion. Once our maritime education sector develops pioneering research areas, we can expand business to other continent nations. Specialised maritime archaeologists, heath and psychology specialises, artists, chefs, cultural performers, technologists and weaponry experts can provide foreign exchange revenue from other African nations. Chapter 24 emphasises how a lack of competition ensures significant growth for maritime education and research providers including watersports, yachting and recreation. We could provide port pricing specialists, maritime economists and businessmen

One of the most significant gaps of the South African Maritime Research Road Map is its conspicuous exclusion of our existing eight ports and related maritime industrial clusters. This report considers significant education, economic, research and training prospects are obvious from the proposed port expansions in Table I. Durban’s proposed, second port expansion on the old International Airport site was evaluated as this author’s UKZN master’s thesis. Its characteristics and investment options are indicated below. Figure VII provides a visual design of the intended port layout. The DIA site (costing R100 billion (excluding Transnet’s R1.8 billion acquisition cost), over 25 years consists of:

• 452 hectares of port related economic activity including storage warehouses/logistics (295 hectares for containers and 24 to transport) with a 9.2 million TEU total cargo capacity.

• 16 berth container terminal (Africa’s largest; most modern) – 7.2million extra TEU’s of containerised cargo capacity.

• A 3 berth vehicle (reefer cargo) terminal.

• A 300 metre long, 4 berth liquid bulk terminal scheduled by 2050.

• Associated marine and cargo infrastructure and services to facilitate port functions.

• Road, rail, water, electricity, waste disposal and other infrastructure including a 450 MI per day desalinisation plant on site providing water for key port users.

• 1.2 kilometre breakwater and excavation of sand dune by DIA/Isipingo Beach.

• An eco-efficient designed Port Captain Control Office.

• An Administrative Craft Basin.

Figure VII: The DIA Site Durban’s Second Proposed Port Design



The Kenyan Port Authority via Mombasa presents our most significant competitive threat. However, as fellow Africans we could invest in their terminals, provide their equipment and other maritime value chain services identified in Table 22.1 rather than others. This applies to any port where it’s preferable to ensure South African/African ownership of facilities for African maritime economic sovereignty. We could also learn from them and similar developments for Walvis Bay, Dar es Salaam, Maputo, Port Louis, Port Victoria and others. Its development is summarised below.

**Phase III: 2013-2020. (KPA Visit August 2014)**

* Tenders awarded for Phase 3 berth, Makupa creek and channel dredging to 15 metres and expanding the turning basin, improving the Cruise Terminal’s Berth 1 and 2, converting 900 metre long Berths 12-14 for containerised cargo and expanding Mombasa Container Terminal from 540,000 to 600,000 TEU (Charts XIV/XV). KPA’s port tariff is modified to finance port upgrades.
* **June 2013.** Completion of Mombasa’s second container terminal to 450,000 TEU, (aimed to reach 1.2 million TEU by 2033), amplified navigational aids, a South Coast port bypass and an access route plus rail renovation.
* **2013:** Liquefied Petroleum Gas (LPG) Terminal construction – increasing capacity to 600,000 metric tonnes and 27,000 DWT tankers.

**Phase IV: 2021+**

* 2021+ involves expanding Berths B4-B7 and installing 2 additional Supersize Gantry cranes. Total port cargo throughput will increase from 450,000 to 1.8 million TEU per year.

Figure VIII: Mombasa’s Proposed Port Expansion



Table 22.1: Macroeconomic Opportunities Presented By An African Port Development



Mombasa Port’s main concern is to become one of the top 20 ports in the world by 2050, competing with Durban. However, South Africans providing the above facilities and services will develop our maritime clusters. We could invest in equivalent logistics and industry not just for the SIP projects in Chapter 23 but develop other African seaport, dry port and connecting economic corridors. We also have an almost absolute advantage in the maritime education and research to support their marine economies. Aside from port expansions, SAIMI and other stakeholders have identified significant employment and economic growth opportunities, which our maritime education sector could assist in research and training. For Mombasa, a previous report by this author identified port facility construction, environmental; planning and other technical consultancy services and transport. It included provisions, equipment, repairs, bunkerage, accommodation, yachting, recreation, restaurants, shops, heritage, port tours and utilities. Other careers include freight forwarding/import/export; marketing, ship repair, construction and building; chartered shipbroking; professional associations; maritime lawyers and specialised maritime researchers –i.e. economists and other consultants. Aside from Nigeria and to a partial extent Kenya, we are the only nation which has specifically formulated maritime legislation and policy drafting. However, we alone have dedicated research associates, qualifications (including postgraduate) and a professional association –MLASA. Our expertise in port pricing, maritime safety, the Research Road Map, Operation Phakisa and the recent Marine Spatial Planning, Customs Duty and Customs Control Bills; provide further opportunities. SAMSA could extend maritime safety courses. In particular we can guide fellow Africans to ensure the following objectives of AIMS become real.

To nurture a sustainable maritime economy and provide sufficiently prepared labour/ skills development in Africa’s maritime power, I proposed the various employment opportunities that could potentially exist to the SA Maritime School and Regent Business School in Durban. This includes freight handling, warehouse, transport and distribution (management and administration) the examples of Cargo handler (loading and offloading vessels), Crane and other equipment operators; transport drivers and coordinators, engineers, repair and maintenance; cleaners and stevedoring. These include those involved in shipping –especially the physical operations and agencies/ logistics, fleet; distribution; marketing; procurement; legal; supply chain processes, purchasing, accounts, records, maritime law, brokerage, chartering and insurance etc. It extends to customs clearing and freight forwarding, working for the port authority; providing port security, catering, health, surveying, repairs etc. It extends to those offering training and education, other forms of road/ rail/ air transport. Other maritime possibilities include oceanography; maritime science; meteorology; providing technology and equipment along with other construction/ tender and miscellaneous, maritime economic opportunities, even financing, investment and real estate speculation. Although offshore oil and gas exploration has been identified; ocean renewable energy, minerals and mining have not received formal investigation and priority as a future area of research and economic opportunities.

**RECOMMENDATIONS:**

The African Union AIMS (African Integrated Maritime Strategy) identifies the following macroeconomic opportunities for the ocean or blue economy in bullet points. Each of these exists only under this general framework without examples of specific projects, research, initiatives, finance, education, training and other practical outcomes. This report therefore proposes South Africa under SAMI and other maritime economy/education participants could provide these opportunities. It proposes chartering Africa’s Exclusive Economic Zones, coastal and territorial waters as a first priority to identify the extent of natural resources and the degree to which exploitation is ecologically, economically, socially and technically feasible. It proposes identifying core education capacity, research capacity and funding capacity. It advocates working with other governments and businesses to establish core African continental and individual nation/company/society priorities and requirements. The African Port Management Association, PMAESA, the Union of African Shippers and the Maritime Organisation of West and Central Africa provide regional associations to contact. Local associations could extend networking, partnerships, expertise and investments beyond our borders, especially where most profitable and advantageous. They could aid in regional capacity building, feasibility studies, projects and consultancy.

**A: Combined Exclusive Maritime Zone of Africa**

**B: Maritime Safety and Security**

**C: Regional Maritime Operational Centres**

**D: Fisheries and Aquaculture**

**E: Integrated Marine Tourism and Leisure**

**F: Giant Africa Aquariums**

**G: Integrated Maritime Human Resources**

**H: Disaster Risk Management**

**I: Hazardous Maritime Materials and Dangerous Goods**

**J: Delineation of Maritime Boundaries**

**K: Maritime Governance**

**L: Maritime Legal and Regulatory Regimes**

This report counsels investigating existing constraints and risks. It recommends developing shipping, aquaculture and marine industry offshoots into other African nations. It suggests evaluating local and foreign competitors. It advises on considering local laws, policies and incentives –and lobbying for modifications when beneficial. It also promotes the following AIMS and other related macroeconomic opportunities prior to investigating the potential of other local South African and African economic sectors for specific maritime research and skills development applications. They also propose the need for research in maritime organised crimes; illegal fishing; natural disasters, marine environmental degradation and climate change. They identify the need for secure African strategic communications systems; modern navigational aids, hydrographic surveys, charts and maritime safety information. They need advice in maritime environment and biodiversity monitoring.

## CHAPTER 23: OTHER ECONOMIC SECTORS AND MARITIME RESEARCH

Investing in a forthcoming age of African maritime scholarship does not have to restrict itself to the demands of Operation Phakisa and a direct maritime economy. Operation Phakisa may serve as South Africa’s actual implementation of African ocean economies but it is not even one of the core 18 Strategic Infrastructure Projects, identified by the government. This chapter therefore focuses on how the resources and effort allocated to Operation Phakisa including the ideas contained within this report; can be applied to other economic sectors and stakeholders within South Africa. This provides a catalyst for expansion into African growth, across borders in Chapter 24. If it is to prevail it needs to satisfy the commercial and other needs of businesses. As across Africa and the Southern Hemisphere, South Africa lacks maritime specific corporations. To finance the facilities, faculties and resources outlined in this report, government alone is insufficient. The first core recommendation of this report is therefore to personally network and contact the following JSE listed companies in Tables 23.1 and 23.2 as among the most significant corporate investors and clients within Africa. With billions of unspent dollar investment reserves; SAIMI/other marine education and supply chain providers need to approach these companies to consider mutually beneficial arrangements. It needs to contemplate how the maritime research, training, education, facilities and services can serve other economic areas.

Table 23.1: JSE Listed Companies or Potential Operation Phakisa, Corporate Economy Contacts

|  |  |
| --- | --- |
| A E C I LIMITED, ABSA BANK LIMITED | INTERWASTE HOLDINGS LIMITED |
| ACCELERATE PROPERTY FUND LIMITED | INTU PROPERTIES |
| ACCENTUATE LIMITED, ACSION LIMITED | INVESTEC AUSTRALIA PROPERTY FUND |
| ADAPT IT HOLDINGS LIMITED | INVESTEC BANK, INVESTEC LIMITED, |
| ADCOCK INGRAM HOLDINGS LIMITED | INVESTEC PLC, INVESTEC PROPERTY FUND |
| ADCORP HOLDINGS LIMITED | INVICTA HOLDINGS, ISA HOLDINGS |
| ADRENNA PROPERTY GROUP LIMITED | ITALTILE LIMITED |
| ADVANCED HEALTH LIMITED | JASCO ELECTRONICS HOLDINGS |
| ADVTECH LIMITED, AEP ENERGY AFRICA | JSE, JUBILEE PLATINUM PLC |
| AFRICAN AND OVERSEAS ENTERPRISES LD | KAAP AGRI, KAP INDUSTRIAL HOLDINGS |
| AFRICAN DAWN CAPITAL LIMITED | KAYDAV GROUP, KIBO MINING PLC |
| AFRICAN EQUITY EMPOWERMENT INVESTMENTS, | KUMBA IRON ORE, LABAT AFRICA |
| AFRICAN MEDIA ENTERTAINMENT, | LEWIS GROUP, LIBERTY HOLDINGS |
| AFRICAN DAWN CAPITAL LIMITED | LIBERTY TWO DEGREES |
| AFRICAN OXYGEN, | LIFE HEALTHCARE GROUP HOLDINGS |
| AFRICAN PHOENIX INVESTMENTS | LONDON FINANCE AND INVEST. GRP PLC |
| AFRICAN RAINBOW MINERALS, AFRIMAT | LONG4LIFE, LONMIN PLC |
| AFROCENTRIC INVESTMENT CORP | MAINLAND REAL ESTATE |
| AH-VEST, ALARIS HOLDINGS | MARSHALL MONTEAGLE PLC |
| ALEXANDER FORBES GROUP HOLDINGS | MAS REAL ESTATE, MASSMART HOLDINGS |
| ALLIED ELECTRONICS CORPORATION LIMITED | MASTER DRILLING GROUP, MASTER PLASTICS, |
| ALVIVA HOLDINGS, ANCHOR GROUP | MAZOR GROUP, MEDICLINIC INTERNATIONAL |
| ANDULELA INVESTMENT HOLDINGS | MERAFE RESOURCES, METAIR INVESTMENTS |
| ANGLO AMERICAN PLATINUM | METROFILE HOLDINGS, M-FITEC INTERNATIONAL |
| ANGLO AMERICAN PLC | MICROMEGA HOLDINGS, MIX TELEMATICS |
| ANGLOGOLD ASHANTI | MMI HOLDINGS, MONDI LIMITED, |
| ANHEUSER-BUSCH INBEV SA/NV | MONDI PLC, MONEYWEB HOLDINGS |
| ANSYS, ARB HOLDINGS | MONTAUK HOLDINGS, MPACT LIMITED |
| ARCELORMITTAL SOUTH AFRICA LIMITED | MR PRICE GROUP, MTN GROUP |
| ARGENT INDUSTRIAL LIMITED | MURRAY & ROBERTS HOLDINGS |
| ARROWHEAD PROPERTIES LIMITED | MUSTEK, NAMPAK, NASPERS |
| ASCENDIS HEALTH LIMITED | NEDBANK GROUP, NEDBANK |
| ASPEN PHARMACARE HOLDINGS LIMITED | NEPI ROCKCASTLE PLC |
| ASSORE LIMITED, ASTORIA INVESTMENTS | NET 1 UEPS TECHNOLOGIES INC |
| ASTRAL FOODS, ATLANTIC LEAF PROPERTIES | NETCARE, NEW FRONTIER PROPERTIES |
| ATLATSA RESOURCES CORPORATION | NEWPARK REIT, NICTUS BEPERK |
| ATTACQ, AVENG LIMITED, AVI LIMITED | NIVEUS INVESTMENTS, |
| BALWIN PROPERTIES, BARCLAYS AFRICA GROUP | NORTHAM PLATINUM, NOVUS HOLDINGS |
| BARLOWORLD, BASIL READ HOLDINGS | NUTRITIONAL HOLDINGS, NU-WORLD HOLDINGS |
| BAUBA PLATINUM, BELL EQUIPMENT | NVEST FINANCIAL HOLDINGS, OANDO PLC |
| BHP BILLITON PLC, BID CORPORATION | OASIS CRESCENT PROPERTY FUND |
| BLUE LABEL TELECOMS BOWLER METCALF | OCEANA GROUP, OCTODEC INVESTMENTS |
| BRAIT SE, | OLD MUTUAL PLC, OMNIA HOLDINGS |
| BRIMSTONE INVESTMENT CORPORATION | ONELOGIX GROUP, ORION REAL ESTATE LIMITED |
| BRITISH AMERICAN TOBACCO PLC | PALLINGHURST RESOURCES LIMITED |
| BSI STEEL, BUFFALO COAL CORP | PAN AFRICAN RESOURCES PLC, PBT GROUP |
| CAFCA, CALGRO M3 HOLDINGS | PEMBURY LIFESTYLE GROUP LIMITED |
| CAPEVIN HOLDINGS | PEREGRINE HOLDINGS LIMITED |
| CAPITAL & COUNTIES PROPERTIES PLC | PHUMELELA GAMING & LEISURE LIMITED |
| CAPITAL & REGIONAL PLC | PICK N PAY STORES PIONEER FOOD GROUP |
| CAPITAL APPRECIATION | PPC LIMITED, PREMIER FOOD AND FISHING |
| CAPITEC BANK HOLDINGS, CARGO CARRIERS | PRIMESERV GROUP, PSG GROUP |
| CARTRACK HOLDINGS, CASHBUILD | PSG KONSULT, PSV HOLDINGS |
| CAXTON CTP PUBLISHERS & PRINTERS | PURPLE GROUP, PUTPROP LIMITED |
| CHOPPIES ENTERPRISES, CHROMETCO | RANDGOLD & EXPLORATION COMPANY LIMITED |
| CITY LODGE HOTELS, CLICKS GROUP | RAUBEX GROUP, RCL FOODS |
| CLIENTELE, CLOVER INDUSTRIES | REBOSIS PROPERTY FUND |
| COAL OF AFRICA COGNITION HOLDINGS | REDEFINE INTERNATIONAL PLC |
| COMAIR, COMBINED MOTOR HOLDINGS | REDEFINE PROPERTIES, REINET INVESTMENTS S.C.A |
| COMPAGNIE FINANCIERE RICHEMONT SA | REMGRO, RENERGEN, RESILIENT REIT |
| CONDUIT CAPITAL | RESOURCE GENERATION, REUNERT LIMITED |
| CONSOLIDATED INFRASTRUCTURE GRP | REX TRUEFORM CLOTHING COMPANY LIMITED |
| CORONATION FUND MANAGERS | RH BOPHELO, RHODES FOOD GROUP HOLDINGS |
| CROOKES BROTHERS,CSG HOLDINGS | RMB HOLDINGS, ROLFES HOLDINGS |

Table 23.2: Additional JSE Listed Companies or Corporate Economy Contacts

|  |  |
| --- | --- |
| CULLINAN HOLDINGS, CURRO HOLDINGS | ROYAL BAFOKENG PLATINUM |
| DATATEC, DELTA EMD, DELTA PROPERTY FUND | SA CORPORATE REAL ESTATE, SABVEST |
| DENEB INVESTMENTS, DIPULA INCOME FUND | SACOIL HOLDINGS, SAFARI INVESTMENTS (RSA) |
| DIS-CHEM PHARMACIES, DISCOVERY | SANLAM, SANTAM, SANTOVA |
| DISTELL GROUP | SAPPI, SASFIN HOLDINGS, SASOL |
| DISTRIB. AND WAREHOUSING NETWORK | SCHRODER EUROPEAN REAL ESTATE INV TRUST PLC |
| DRDGOLD, E MEDIA HOLDINGS | SEA HARVEST GROUP, SEPHAKU HOLDINGS |
| EASTERN PLATINUM | SHOPRITE HOLDINGS, SIBANYE GOLD |
| ECHO POLSKA PROPERTIES N.V. | SILVERBRIDGE HOLDINGS, SIRIUS REAL ESTATE |
| ECSPONENT, EFFICIENT GROUP, ELB GROUP | SOUTH OCEAN HOLDINGS, SOUTH32 |
| ELLIES HOLDINGS, EMIRA PROPERTY FUND | SOVEREIGN FOOD INVESTMENTS, SPANJAARD |
| enX GROUP, EOH HOLDINGS | SPEAR REIT, SPUR CORPORATION |
| EPE CAPITAL PARTNERS | STANDARD BANK GROUP |
| EQUITES PROPERTY FUND | STEFANUTTI STOCKS HOLDINGS |
| ERIN ENERGY CORPORATION, ESOR | STEINHOFF INTERNATIONAL HOLDINGS N.V. |
| eXtract GROUP, EXXARO RESOURCES | STEINHOFF INVESTMENT HOLDINGS LD |
| FAIRVEST PROPERTY HOLDINGS, | STELLAR CAPITAL PARTNERS LIMITED |
| FAMOUS BRANDS | SACOIL HOLDINGS, SAFARI INVESTMENTS (RSA) |
| FERRUM CRESCENT, FINBOND GROUP LIMITED | STENPROP, STOR-AGE PROPERTY REIT |
| FIRSTRAND, FORTRESS INCOME FUND | STRATCORP, SUN INTERNATIONAL |
| GAIA INFRASTRUCTURE CAPITAL | SUPER GROUP, SYGNIA, TASTE HOLDINGS |
| GEMGROW PROPERTIES, GLENCORE PLC | TAWANA RESOURCES NL |
| GLOBAL ASSET MANAGEMENT LIMITED | TELEMASTERS HOLDINGS LIMITED |
| GLOBE TRADE CENTRE S.A. | TELKOM SA SOC, TEXTON PROPERTY FUND |
| GO LIFE INTERNATIONAL LIMITED | THARISA PLC, THE BIDVEST GROUP |
| GOLD BRANDS INVESTMENTS LIMITED | THE FOSCHINI GROUP, THE SPAR GROUP |
| GOLD FIELDS, GRAND PARADE INVESTMENTS | TIGER BRANDS, TISO BLACKSTAR GROUP SE |
| GREENBAY PROPERTIES, GRINDROD | TONGAAT HULETT, TORRE INDUSTRIES |
| GRIT REAL ESTATE INCOME GROUP | TOWER PROPERTY FUND, TRADEHOLD |
| GROUP FIVE LIMITED | TRANS HEX GROUP, TRANSACTION CAPITAL |
| GROWTHPOINT PROPERTIES LIMITED | TRANSCEND RESIDENTIAL PROPERTY FUND |
| HAMMERSON PLC | TRANSPACO, TRELLIDOR HOLDINGS |
| HARMONY GOLD MINING COMPANY LIMITED | TREMATON CAPITAL INVESTMENTS |
| HERIOT REIT, HOLDSPORT LIMITED | TRENCOR, TRUSTCO GROUP HOLDINGS |
| HOMECHOICE INTERNATIONAL PLC | TRUWORTHS INTERNATIONAL |
| HOSKEN CONSOLIDATED INVESTMENTS LIMITED | TSOGO SUN HOLDINGS |
| HOSPITALITY PROPERTY FUND LIMITED | UNICORN CAPITAL PARTNERS, UNIVERSAL PARTNERS |
| HOWDEN AFRICA HOLDINGS | VALUE GROUP, VERIMARK HOLDINGS |
| HUDACO INDUSTRIES, HUGE GROUP | VODACOM GROUP, VUKILE PROPERTY FUND |
| HULAMIN, HULISANI | VUNANI, W G WEARNE |
| HWANGE COLLIERY COMPANY | WESCOAL HOLDINGS, WESIZWE PLATINUM |
| HYPROP INVESTMENTS, IMBALIE BEAUTY | WILDERNESS HOLDINGS LIMITED |
| IMPALA PLATINUM HOLDINGS LIMITED | WILLIAM TELL HOLDINGS LIMITED |
| IMPERIAL HOLDINGS, INDEQUITY GROUP | WILSON BAYLY HOLMES-OVCON LIMITED |
| INDLUPLACE PROPERTIES | WINHOLD LIMITED, WOOLWORTHS HOLDINGS |
| INGENUITY PROPERTY INVESTMENTS LIMITED | WORKFORCE HOLDINGS, YORK TIMBER HOLDINGS |
| INSIMBI REFRACTORY & ALLOY SUP | ZEDER INVESTMENTS |

Everything that the maritime sector can produce, all that it can contribute; reduces our dependency on external sources. It enhances our resilience, improving our academic and economic sovereignty. Our economies benefit from maximising local procurement, absolute and comparative advantage. Until these companies are approached, the extent of our possibility production frontier is completely unknown! This reports second recommendation is to review the following Table 23.3 national state-owned enterprises. Government should favour import substitution where commercially advantageous stimulating local incomes, employment, expenditure, consumption, production and investment. Figure X provides provincial equivalents or ‘parastatals.’ Other economic sectors which could benefit specifically from maritime research include SASOL (with ocean renewable energy and investigating marine biofuels). Aquaculture and marine reserves may assist the pharmaceutical industry. Marine technology and engineering may assist our automotive industry. Agriculture and food processing might benefit from sustainable aquaculture techniques, water conservation and even research extending the shelf life of seafood. The insurance sector may benefit from amplified oceanic risk management and banking from maritime banking/technology innovations. Our security sector could specialise in vessels, maritime structures including offshore rigs and maritime security risks. Cybersecurity, submarines, underwater robots and mining, energy and water security provide options. Through reducing imports, facilitating maritime exports, processing, value adding and interior supply chain transhipment for Africa; economic sovereignty is continued.

Economic potential exists in whatever skills, equipment, technology, product or service that our country and continent currently import and finding ecologically and commercially viable means to replicate these locally, developing and diversifying our maritime economy. Local demand, supply and cost competitiveness need to be scrutinised. Creating maritime resource security, ecological rehabilitation and reserves, provides additional capacity to experiment. The implications of sea and dry port expansion, navigation in hazardous coasts, improved surveys and satellites offer more chances. Our mining and space economy sectors along with eco, medical and aviation tourism/recreation industries could benefit from their maritime counterparts. Maritime culture through art and cuisine, literature, music, drama and the film industry has yet to be explored. Diving, other watersports, photography and recreation provide course opportunities. Before all these and other opportunities are exploited the institutional capacity needs to be fabricated. The most efficient mechanism to allocate resources is generate the specific demand for maritime education and research from not just directly related stakeholders and professional associations but those in other economic sectors i.e. this chapter.

Table 23.3: South African National State Owned Enterprises/Parastatal Contacts

|  |  |
| --- | --- |
| Accounting Standards Board | National Student Financial Aid Scheme |
| Agricultural Research Council (ARC) | National Youth Development Agency |
| Air Traffic and Navigation Services Company | Passenger Rail Agency of South Africa |
| Airports Company South Africa (ACSA) | Perishable Products Export Control Board |
| Alexkor Limited | PetroSA (Pty) Ltd |
| Armaments Corporation of South Africa (ARMSCOR) | Private Security Industry Regulatory Authority |
| Blind SA, Brand South Africa | Public Investment Corporation, Rand Water |
| Breede-Overberg CMA (BOCMA) | Road Traffic Infringement Agency |
| Broadband Infraco, Central Energy Fund (CEF) | Road Traffic Management Corporation |
| Commission for Conciliation, Mediation and Arbitration | Safety and Security, Sector Education & Training Authority (SASSETA) |
| Companies and Intellectual Property Commission | Small Enterprise Development Agency |
| Competition Commission; Competition Tribunal | Small Enterprise Finance Agency |
| Forest Industries Education and Training Authority | South African Airways (SAA) |
| Free State Development Corporation,  Housing Development Agency  Human Sciences Research Council | South African Agency for Science and Technology Advancement |
| Government Employees Medical Scheme | South African Broadcasting Corporation (SABC) |
| Government Employees Pension Fund (GEPF) | South African Bureau of Standards |
| Health Professions Council of South Africa (HPCSA) | South African Civil Aviation Authority |
| Health and Welfare Sector Education and Training Authority  Independent Development Trust | South African Council for Educators, South African Council for Social Service Professions |
| Industrial Development Corporation | South African Diamond and Precious Metals Regulator |
| Ingonyama Trust Board Institute of People Management | South African Forestry Company (Ltd) (SAFCOL) |
| Ithala Development Finance Corporation (Ltd) | South African Heritage Resources Agency |
| Khula Enterprise Finance, | South African Institute for Drug-Free Sport |
| Land Bank and Agriculture Bank of South Africa | South African Local Government Association (SALGA) |
| Legal Aid South Africa | South African National Council for the Blind |
| Limpopo Economic Development Enterprise | South African National Parks (SANParks) |
| Media Development and Diversity Agency; Mhlathuze Water | South African National Road Agency |
| Mining Qualification Authority | South African Post Office |
| Mintek (Council for Mineral Technology) | South African Qualifications Authority |
| National Advisory Council on Innovation | South African Reserve Bank |
| National Agricultural Marketing Council | South African Social Security Agency |
| National Archives of South Africa | South African Special Risk Insurance Association |
| National Arts Council of South Africa | South African State Theatre - Pretoria |
| National Consumer Commission | South African Tourism, |
| National Credit Regulator; National Development Agency | South African Veterinary Council |
| National Economic Development and Labour Council | South African Weather Service |
| National Electronic Media of South Africa | Special Investigating Unit (SIU) |
| National Empowerment Fund, National Energy Regulator | State Information Technology Agency |
| National Film and Video Foundation | Technology Innovation Agency |
| National Home Builders Registration Council | Telkom SA |
| National House of Traditional Leaders | Trade and Investment South Africa (TISA) |
| National Housing Finance Corporation | Transnet (Ltd) |
| National Lotteries Commission | Universal Service Agency and Access of South Africa |
| National Ports Authority | Water Research Commission |

Figure X: South African Provincial Owned Enterprises/Parastatals

|  |  |  |
| --- | --- | --- |
| [Picture](http://www.govpage.co.za/artscape-theatre-centre.html) | [Picture](http://www.govpage.co.za/automotive-industry-development-centre-aidc.html) | [Picture](http://www.govpage.co.za/breede-overberg-catchment-management-agency-bocma.html) |
| [Picture](http://www.govpage.co.za/cape-film-commission.html) | [Picture](http://www.govpage.co.za/capenature.html) | [Picture](http://www.govpage.co.za/coega-development-corporation-cdc.html) |

|  |  |  |
| --- | --- | --- |
| [Picture](http://www.govpage.co.za/dube-tradeport.html) | [Picture](http://www.govpage.co.za/eastern-cape-appropriate-technology-unit-ecatu.html) | [Picture](http://www.govpage.co.za/eastern-cape-development-corporation-ecdc.html) |
| [Picture](http://www.govpage.co.za/eastern-cape-socio-economic-council-ecsecc.html) | [Picture](http://www.govpage.co.za/eastern-cape-parks-and-tourism-agency-ecpta.html) |  |

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| [Picture](http://www.govpage.co.za/eastern-cape-rural-development-agency-ecrda.html) |  | [Picture](http://www.govpage.co.za/east-london-industrial-development-zone-elidz.html) |
| [Picture](http://www.govpage.co.za/ezemvelo-kzn-wildlife.html) | [Picture](http://www.govpage.co.za/free-state-development-corporation-fdc.html) | [Picture](http://www.govpage.co.za/kwazulu-natal-film-commission.html) |

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| [Picture](http://www.govpage.co.za/gauteng-enterprise-propeller-gep.html) | [Picture](http://www.govpage.co.za/inkomati-catchment-management-agency-iucma.html) | [Picture](http://www.govpage.co.za/limpopo-tourism--parks.html) |

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| [Picture](http://www.govpage.co.za/gauteng-growth-and-development-agency-ggda.html) | [Picture](http://www.govpage.co.za/gauteng-infrastructure-financing-agency-gifa.html) | [Picture](http://www.govpage.co.za/mpumalanga-tourism-and-parks-agency-mtpa.html) |
| [Picture](http://www.govpage.co.za/gauteng-tourism-authority.html) | [Picture](http://www.govpage.co.za/limpopo-economic-development-enterprise-limdev.html) |  |

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| [Picture](http://www.govpage.co.za/ingonyama-trust-board.html) | [Picture](http://www.govpage.co.za/ithala-development-finance-corporation.html) | [Picture](http://www.govpage.co.za/invest-north-west-inw.html) |
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| [Picture](http://www.govpage.co.za/northern-cape-economic-development-trade-and-investment-promotion-agency-nceda.html) | [Picture](http://www.govpage.co.za/trade--investment-limpopo-til.html) | [Picture](http://www.govpage.co.za/natal-sharks-board.html) |
| [Picture](http://www.govpage.co.za/north-west-development-corporation-nwdc.html) | [Picture](http://www.govpage.co.za/the-innovation-hub.html) | [Picture](http://www.govpage.co.za/north-west-parks--tourism-board.html) |

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| [Picture](http://www.govpage.co.za/trade--investment-kwazulu-natal-tikzn.html) | [Picture](http://www.govpage.co.za/western-cape-investment-and-trade-promotion-agency-wesgro.html) | [Picture](http://www.govpage.co.za/tourism-kwazulu-natal.html)  Tourism KwaZulu Natal |
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Finally, this report proposes the core maritime curriculum areas and ideas proposed in this manifesto can provide economic opportunities; especially for the following 18 specific projects developed by the national government. It cautions prior to implementing the recommendations in this report, AIMS and embarking upon the SA Maritime Research Roadmap, our maritime education sector with its highly constrained capacity should ensure existing priorities are successfully delivered. Digital marketing, the Internet of Things, automation, ‘smart’ technology,’ 3D printing, laser, robotic and biotechnology provide emergent South African economic sectors, where developing maritime research capabilities could assist. Aside from the South African Department of Trade and Industry, the US Consular services publish frequently updated information about import/exports, core stakeholders and marketing events, to assist in networking.

South African Strategic Infrastructure Projects And Further Economic Opportunities

* **SIP 1: Unlocking the northern mineral belt with Waterberg as the catalyst:**
* This could connect to developments in maritime business and logistics, ports, maritime law and finance, ocean renewable energy, mining and surveying, risk management, psychology and health.
* **SIP 2: Durban-Free State-Gauteng logistics and industrial corridor**
* This could benefit from the above areas, climate change, the space economy, and related marine economy/industry developments from cabotage to cruising and marine tourism, customs modernisation, aquaculture, marine engineering/naval architecture, maritime industry equipment, maritime heritage and history, culture, the navy and security, yachting and recreation.
* **SIP 3: South-Eastern node & corridor development**

Similar benefits to the above for COEGA and Port Elizabeth

* **SIP 4: Unlocking the economic opportunities in North West**

Developments in aquatic security, aquaculture –for agriculture

* **SIP 5: Saldanha-Northern Cape development corridor**

As above.

* **SIP 6: Integrated municipal infrastructure project**
* **SIP 7: Integrated urban space and public transport programme**
* **SIP 8: Green energy in support of the South African economy**

Ocean renewable energy, energy efficiency, marine engineering and technology, marine pollution control equipment, monitoring probes and software

* **SIP 9: Electricity generation to support socio-economic development**

As above.

* **SIP 10: Electricity transmission and distribution for all**

As above

* **SIP 11: Agri-logistics and rural infrastructure**

Aquatic security, aquaculture, logistics, ports and maritime business, marine tourism

* **SIP 12: Revitalisation of public hospitals and other health facilities**

Maritime health, psychology, risk management and uncertain factors and potential implications to assist the implementation of the National Health Insurance scheme.

* **SIP 13: National school build programme**
* **SIP 14: Higher education infrastructure**

The 2 new universities and suggestions in maritime education provides experience not just for reforming the existing higher education sphere but subsequent institutions created or expanded. Introducing ocean popular understanding adds basic course awareness over the maritime sector.

* **SIP 15: Expanding access to communication technology**

Marine technology, education, communications and cybersecurity/risk management can improve terrestrial connections

* **SIP 16: SKA & Meerkat**

This could specifically link to the space economy, climate change, risk management and uses for satellites including maritime law and governance, resource and species conservation etc.

* **SIP 17: Regional integration for African cooperation and development**

Maritime law and diplomacy, education and finance –linking to other African nations for South African skills, research, experience, facilities, risk management and funding capital –enhancing capacity

* **SIP 18: Water and sanitation infrastructure**

Aquatic security, risk management, climate change and maritime health.

## CHAPTER 24: GROWTH INTO AFRICA

With 54 countries (15 of which, are landlocked), 1 billion inhabitants and 315 official ports; Africa has proclaimed its intentions to invest in a forthcoming maritime economic dawn. The African Union have ratified its Integrated Maritime Strategy. However, only South Africa, Egypt and Ghana offer devoted maritime universities. Nigeria and Kenya offer limited maritime training courses. However, port expansion projects are expanding from Dakar to Mombasa, Dar es Salaam, Port Victoria and Port Louis (Table I). The institutional capacity however, relies on foreign consultants with a limited maritime industry or knowledge economy. When it moves beyond rhetoric, only South Africa has actually invested in a clear manifesto with formal resources, access to capital, devoted researchers, strategies, field projects, legislation policies, a specific research road map, student career awareness and recruitment drives. This chapter therefore briefly identifies the future of maritime education once the ideas implemented in this report and the road map are progressing. If we wish to target 1000,000 jobs, prosper and utilise a growing surfeit of maritime education capacity; we can pursue growth into Africa.

Figure X: The African Continent Island



Source: www.slideshare.net. Viewed 13 August 2017.

This report argues existing institutional capacity remains limited for our maritime knowledge economy. The existing road map and other documents have not investigated the actual numbers of undergraduate, postgraduate, courses, staff places and research output available. Figures XI and XII identify the comparatively few maritime research areas and limited numbers of students in which we can train South Africans. We therefore have limited capacity to capture the demand for our own maritime economy before investing and supporting other African and foreign students. Therefore, this report proposes expanding maritime education to sufficiently satisfy our own demand, supply, research, economy and stakeholder requirements. This will provide the experience, funding, networking, human and other resources necessary to create and expand alternative campuses outside our borders.

Figure XI: Existing South African Supply Prospects For Operation Phakisa Part I:

**Figure XII: Existing South African Supply Prospects For Operation Phakisa Part II:**

As evident by Table I and Figure X; South Africa is missing out as the foremost provider of African maritime education, research, consultancy services, training, capital and economic opportunities. Growth into Africa has not even been identified as an eventual let alone, intermediate research or policy objective for Operation Phakisa, our maritime economy and research road map strategy. Of all African nations, we have the greatest capacity to contribute towards the existing African demand prospects for maritime education and these other services. Figure XIII identifies a maximum annual total 3429 students demanding and actually receiving a place. We can provide 1935 at most –including our own students. Yet our target in South Africa is 1000,000 jobs by 2033? 403 African students managed to secure a place at the World Maritime University in Sweden. These figures exclude those at other maritime related universities, colleges and courses globally. These figures specifically exclude the demand generated by those Africans who lacked the resources, capacity and qualifications/experience to go abroad. This ignores the demand of prospective African students lacking the marketed career/vocational guidance awareness of the prospects offered by the maritime economy/education in South Africa. In 2014, South Africa graduated 23 postgraduate students funded by TETA (our Transport and Training Education Authority). Each Master’s degree cost $28,800 in fees per year, excluding living costs. Each PHD cost $34,600. The University of Tasmania are now targeting Africans with specific marketing strategies. Although this author was fortunate to receive a tuition waivered scholarship, Australia still benefitted from partial costs subsidised from the national South African government. A PHD costs $100,000 for those who have to pay.

Figure XIII: Existing African Demand Prospects For Maritime Education:

Therefore, significant commercial opportunities exist if South Africa were to invest in maritime education and training abroad and expanding local capacity and facilities for African students/researchers. Even charging lower or similar prices would have dual benefits. First we would be aiding our own local economy and graduates to seek employment. We would also be improving SIP 17 or African regional cooperation and capacity. We would benefit from African ideas, contributions and experience. Secondly, we would be diverting exorbitant capital outflows away from affluent, foreign maritime universities and training providers. The first priority would be to work with local governments/corporations/individuals to establish formal education alliances and partnerships. They could offer scholarships, legal, financial and other incentives. We could expand existing places and opportunities in phases. International visitors (faculty or students), could receive specific facilities, services, culture introductions, local hosts and events. Given scarce staff and other resources we could expand more distance/online and virtual courses –minimising the need/time for physical presences. Private and public sector could work with other African maritime training institutions existing to revive the moribund African Association of Maritime Training Institutions, founded by Egypt’s Arab Academy of Science, Transport and Technology.

This report then proposes investigating existing African market conditions through surveys and the other techniques identified in this report. Strategic marketing could then assess the demand and other requirements to establish offshoot campuses/branches of existing South African institutions, seeking professional SAQA, regional African and international registration/accreditation. Eventually if these flourish, entirely new devoted maritime education centres, consultancy, pilot projects and other economic investments could be formed especially in key African economies, education markets and port developments such as Senegal, the Ivory Coast, Mozambique/Tanzania, Morocco and Algeria. Even landlocked countries might be interested in improving customs, dry ports, logistics, law and other expertise.

Other maritime education opportunities in Africa include assisting Nigeria with its recent cabotage initiatives, training its seafarers, engineers and shipyards. In 2014, the Association of African Universities President specifically challenged African universities to promote maritime training and education to capture ocean value creation. “***Today, our water bodies are facing challenges ranging from human wickedness through piracy, and other unexplainable phenomena such as climate change, for which we need a well-trained work-force to help us unravel. We need to ensure a safe and secured Maritime and riverine environment, managed by well-trained maritime professionals.’*** The willingness of international shipping companies to contribute was noted. He called for specialised African Professorships and research chairs, devoted funding and targeting African problems with initiatives. We could link to professional associations, governments, companies, society, individuals, local media and other stakeholders. Kenya’s Institute of Chartered Ship Broker’s East African branch have chastised the Kenyan government for not catering for local maritime education demand. It represents a major South African concern that our maritime education strategic advantages are not internationally recognised. They have developed interest in courses in seafaring, maritime finance, ship broking, logistics, port terminal operations and marine insurance. They have had to extract 23 internationally trained deck officers and 16 marine engineers as lecturers for Mombasa Technical University. The first time Africa is scheduled to host the International Association of Maritime Economists in its 26 year existence; -and they pick the lobbying of Mombasa and Kenya’s Port Authority. Growth into Africa would further solidify our reputation as the premier emissary of African maritime education, investment, research and the economy.

Internationally; global demand exists in this evolving market. International Chamber of Shipping estimates a global shortage of 16,500 marine officers (supply of 774,000) and surplus of 102,500 seafarers (supply of 873,600). However, these figures completely ignore the requirements if we in Africa were to enhance our merchant, naval, law enforcement, fishing, research and other cabotage registered fleets. By 2030, demand prospects are forecast to improve based on 3-4% average, annual seabourne trade growth (1990-2015) (UNCTAD 2015) to a shortage of 147,000 officers internationally, given blue economy growth opportunities if sustainable. South Africa’s Society of Master Mariners identifies that each oil rig could recruit over 100 crew. It identifies a reasonable turnover rate for Transnet, Unicorn Shipping, Sea Harvest and I&J.

Africa’s highest ranking and most credible universities already possess the experience to extend existing partnerships and to develop new partnerships. The University of the Cape Coast, Ghana possesses 76 partnerships, SA’s DUT 70. Similar principles could be applied to pursuing African growth. Varieties could include student, researcher and lecturing exchanges, cultural tours, funding, scholarships, campuses, seed projects, technical advice and specialised facilities support, research, joint conferences, sports, events and degrees, marketing, increased collaboration and other connections. Specific offices and staff could focus on regional African connections –strengthening, recruitment, fund raising, publicity and alumni along with internationalisation as our campuses expand and develop specialised areas. Efforts could be invested in maritime vocational colleges and training courses lacking the prestige, experience, resources and networking capacity of more venerable institutions, including Al-Karaouine University, Al-Azhar University, Fourah Bay College, UCT, Stellenbosch, Rhodes, Witwatersrand, UKZN and Makarere. The EU and Mwalimu Nyerere schemes exist to enrich inter-African academia. Inter-African academic mobility needs development for the future of the maritime sector until growth into Africa can be pursued, strengthening existing capacity. Finally, we have no partnerships among the few existing maritime institutions, associations’ industry companies and professionals in Africa. Internationally South African lack connections and formal partnerships/exchanges and other growth prospects to IAMU and IAML specific maritime education and research specialist providers.

## CHAPTER 25: CONNECTING MARITIME EDUCATION TO OTHER STRATEGIC SA OBJECTIVES

The consequences of investing in maritime education as South Africa’s destiny cannot be forecast absolutely. However, this collation has already emphasised how other sectors and stakeholders may prosper. However, this chapter formally analyses how this quintessential part of Operation Phakisa can serve other strategic, South African policies and objectives. There are 48 separately listed government departments on the central website. Each has their own plans. Yet few have actually aligned with existing academia and facilities to motivate and attain their targets. This chapter recognises the complete ignoring of existing maritime policy documents to other strategic South African objectives. It therefore summarises and evaluates these government targets in bullet points below; linking their issues to specific maritime research areas, stakeholders and resources.

These seek to reduce poverty, inequality and education constrictions. Along with the National Development Plan and previously summarised opportunities of the 18 SIP Projects. It aims to increase service delivery, community and economic development. Through awareness, import substitution, pilot projects, commercialisation, skills and technology transfer, experience, information/research, advice, assistance, networking and funding, it seeks to inspire fellow South Africans of the need and value for innovation. It emphasises how the maritime sector is not just a projected state fantasy but actually provides outcomes. It reduces risks and externalities. It improves economic potential. Through this will increase popular, ocean familiarisation appreciation and understanding in our land orientated society, economy, politics, history and culture. Simultaneously this assures Operation Phakisa evolves from dreams to reality and attains our other strategic objectives.

* Department of Agriculture, Forestry and Fisheries Strategic Plan 2015-2020
* Department of Communications: Strategic Plan 2013-2018
* Department of Defence Strategic Plan 2015-2020
* Department of Higher Education and Training Revised Strategic Planv2015-2020
* DHET Research Agenda
* Department of Mineral Resources Strategic Plan 2014-2019
* Department of Rural Development and Land Reform
* Department of Science and Technology Innovation Plan
* Department of Trade and Industry Industrial Policy Action Plan
* Home Affairs Strategic Plan 2015/2016-2019/2020
* International Relations and Cooperation, Revised Strategic Plan 2015-2020
* National Tourism Sector Strategy 2017
* Water and Sanitation Strategic Plan 2015/2016-2019/2020

The Presidential Infrastructural Coordinating Commission is responsible for implementing Operation Phakisa under the Treasury. It aims to consider a long-term perspective –which higher education including our existing maritime universities and colleges can assist in, rather than political considerations of 5 year electoral cycle, more instantaneous, public reactions and blaring media headlines. Aside from the 18 SIP projects, the South African economy is based on the National Development Plan. The following 15 objectives until 2030 are highlighted in bullet points below. These can be linked to maritime education via our researchers, lecturers, students and facilities applying maritime related concepts, inventions, discoveries, resources, capital, employment and experience to the NDP’s specific plans to develop each sector. For example, our construction industry could benefit from increased awareness of maritime risks, maritime, naval and ocean engineering, climate change, potential ocean renewable energy, logistics, energy efficiency, security, maritime art and culture. Improved maritime/port performance, efficiency, sustainability and capacity can improve intermodal transport and supply chain activities, augmenting economic infrastructure. Each business sector could gain from IT, maritime security, maritime law, maritime business skills and port economics. Tourism could benefit from these, marine, eco and cruise tourism. Even the 969,500 targeted agricultural jobs could benefit from developments in aquatic security, climate change, maritime risk management, maritime business, finance and logistics. They could benefit from similar techniques to aquaculture, utilising an extension service. This report proposed this service to enhance community exposure and experience of maritime research achievements. The National Infrastructure Plan allocated an initial R827 billion to updating infrastructure. SAIMI and other maritime stakeholders can ensure that maladaptation is minimised especially for marine/coastal environments, climates and participants. It can facilitate local source procurement and contracts, minimising foreign exchange and balance of payment costs as much as possible. Individual projects would find it more cost effective to sponsor specific faculty/students to research specific problems.

* **Chapter One-** **Policy making in a complex environment**
* **Chapter Two-** **Demographic Trends**
* **Chapter Three-** **Economy and Employment**
* **Chapter Four-** **Economic Infrastructure- the foundation of social and economic development**
* **Chapter Five-** **Ensuring environmental sustainability and equitable transition to a low- carbon economy**
* **Chapter Six-** **An integrated and inclusive rural economy**
* **Chapter Seven-** **Positioning South Africa in the World**
* **Chapter Eight- Transforming human settlement and the national space economy**
* **Chapter Nine- Improving education, training and innovation**
* **Chapter Ten-** **Promoting health**
* **Chapter Eleven-** **Social Protection**
* **Chapter Twelve –** **Building safer communities**
* **Chapter Thirteen- Building a Capable Developmental State**
* **Chapter Fourteen- Fighting Corruption**
* **Chapter Fifteen-** **Transforming society and uniting the country**

President Zuma in his State of the Nation Address of February 2017; identifies a phenomenal number of jobs are to be developed and sustained within a perpetually shrinking, time frame. He also singled out ‘the War on Leaks,’ Independent Power Producers Program, Invest SA and the Expanded Public Works Programme as specific initiatives, which this report proposes the maritime sector can benefit from. He singled out Operation Phakisa, ocean economy chances –for a new SA Navy/Denel/Armscor partnership for state vessels. Chances include tourism growth, beneficiation, industrialisation, agro-processing and energy security. The EU has signed a preferential trade agreement for over 90% of South African exports –to aid our marine industry supply chains in existing and future categories. This report proposes the above techniques developed for maritime education can be applied to other strategic sectors. It argues that maritime research can assist in achieving projected economic growth. It can adjust demand and supply. It can reduce existing education, research, training, productivity, health and experience constraints. Improved transport, logistics, maritime health, ecosystems, risk monitoring, security, culture; the proposed Listening Service; means to attain employment, student financing and co-benefits of facilities produces social spillovers and economic multipliers. This would satisfy equivalent Strategic Plans for the Departments of Labour, Economic Development and others.

Each of the following government, National Strategic Plans and policies for South Africa can provide funding, resources and support to the maritime sector. This is provided each application is motivated with direct specific reference as to how the proposer can personally help the client/government to achieve their unique targets asap. The maritime industry and education sector could benefit from the R300 billion of Transnet’s logistics network modernisation. Even the Department of Arts and Culture could be interlinked with a fledgling maritime culture and heritage through Business and Arts South Africa supporting grants, the National Arts’ Council, National Film and Video Foundation and National Heritage Council. The Department of Environmental Affairs have specifically targeted Operation Phakisa but their ‘Working For the Coast” programme and Youth Environmental Services could benefit from increased awareness of risks, maritime geography, oceanography, maritime ecosystems and biodiversity, marine pollution and other factors. Working for Wetlands and the ‘Wildlife Economy in South Africa” would similarly gain from extension into the maritime domain. Transfrontier Conservation Areas and Peace Parks Initiatives might similarly benefit if extended to maritime sanctuaries/tourism. They might benefit from this report’s conceptual maritime research contributions in marine contact, maritime law enforcement, communications and technology.

* **Department of Agriculture, Forestry and Fisheries Strategic Plan: 2015-2020.**

Maritime research –especially for aquaculture could link to the following programs more effectively. Programs include African Agricultural Development Programme; Agricultural Broad-Based Black Economic Empowerment; Comprehensive Agricultural Support Programme; Integrated food Security and Nutrition Programme; Natural Resources Management; Research and Development; National Regulatory Services plus Sanitary and Phytosanitary Measures. They include LARP, LandCare, Business Plan Guidelines; DAFF Female Entrepreneur Awards; Vulnerable Workers on Farms, in Forestry and Fisheries Programme| and Small Holder Farmer Evaluation. Maritime education and training could promote animal health; logistics, marketing, export and investment via extension classes. South Africa’s existing Land Bank and other incentives could be adapted to the formation of a Marine Bank –develop aquaculture, marine ecology, industry and other ocean equivalent, maritime financing and insurance requirements. Maritime education and training contribute towards the Agricultural Policy Action Plan. Programme 2 concerns are agricultural production, health and safety. Programme 3 concerns are food security and agrarian reform. Programme 4 incorporates trade promotion and market access. Program 6 includes fisheries. Report recommendations can aid marine resource management; monitoring, control and surveillance plus aquaculture and economic development.

* **Department of Communications Strategic Plan: 2013-2018.**

Maritime security, communications and risk management could specifically benefit the undersea, 2012 Western African Cable System and any others that might be improved to improve our own broadband capacity. Space satellites/maritime industry may jointly benefit the Department of Communications’ other goal to convert to digital television migration. This would implement the Strategic Plan’s programmes 3 (Policy research and capacity development), 4 (broadcasting and communications) and 5 (ICT Infrastructure support and broadband), if channelled.

* **Department of Defence Strategic Plan: 2015-2020.**

Other countries have formed historically strong partnerships between their navies, maritime health and defence communications/intelligence networks with research institutions. They collaborate in improving vessel design, armaments, crew training, naval performance and operations. It can aid logistics and general support. This report mentions improved opportunities exist for naval research, trained seafarers (as reserves), maritime engineering, naval architecture, surveying, maritime communications, physical and cybersecurity, warfare, law enforcement, logistics, human factors and maritime health. It could aid via maritime risk management, climate change, uncertain maritime futures and ocean popular awareness. This contributes towards Strategic Leadership, Human Resources/Organisational and Capability Renewal as declared intentions.

* **Department of Higher Education and Training Revised Strategic Plan: 2015-2020.**

This report proposes implementing this plan through stakeholder coordination, awareness and cooperation. Augmenting maritime education recruitment, training, curriculum quality, qualifications, student experiences and employability skills could particularly link to its priorities and research themes.

* **DHET Research Agenda.**

The maritime sector and Operation Phakisa are conspicuously absent from the official research agenda, despite this volume’s suggestions about how maritime education can benefit general education and the economy.

* **Department of Mineral Resources Strategic Plan 2014-2019.**

Maritime research could indirectly enable the following outcomes if working with the Department to improve logistics, mining techniques, maritime related risks, technology and other divisions. It can progress the small business development section. Expanding maritime education presents opportunities to extend training beyond the initial 50 unemployed graduates per year, under the Mining Qualification Authority sponsorship scheme. It can assist mine health and safety; mineral regulation; beneficiation, mineral policy and promotion.

* Outcome 1 Education
* Outcome 2 Health
* Outcome 3 Safety
* Outcome 4 Economy
* Outcome 5 Skills
* Outcome 6: Infrastructure
* Outcome 7 Rural Development
* Outcome 8 Human Settlements
* Outcome 9 Local Government
* Outcome 10 Environment
* Outcome 11 International
* Outcome 12 Public Service
* Outcome 13 Social
* Outcome 14 Nation Building
* **Department of Rural Development and Land Reform Strategic Plan**

The maritime research sector could benefit Programme 2: National Geomantics Management Scheme and Programme 3 Rural Development: It can target maritime rights, aquatic security, surveying, coastal tourism, ecosystems and climate change.

* **Department of Science and Technology Innovation Plan**

The maritime education sector can specifically aid the department plan through improving human resources and knowledge infrastructure to achieve the ‘gap’ between research results and actual socio-economic attainments. It can attain this via specific employment, employability skills, new businesses, enhanced competitiveness, tax revenues and other measurable indicators. The plan indicates the ‘Farmer to Pharma bio-economy value chain. This is mirrored in the DTI Plan below to aid the pharmaceutical, agriculture and aquaculture industries. Biotechnology only produced 5 start-ups. Yet this report has focused on maximising the possible contributions of each maritime student through specialised resources, recruitment and support, applicable elsewhere. This report has linked the maritime sector implications for the space economy –especially satellites, technology and precise, small components manufacturing. In 2015, the satellite industry offered over $90 billion of opportunities.

The Innovation Plan’s objective of energy security could benefit from research into ocean renewable energy, maritime geography/surveying risk management, climate change and uncertainty with maritime futures. It could investigate engineering, logistics and resource capacity for the plans’ desire to capture 25% of the global hydrogen fuel cell market –using our platinum advantage. The maritime sector could assist the newly conceived Climate Change Research Institute and focus on global change science. The plan also mentions subsidiary goals to increase the number of enrolled students, research output and PHD’s produced, outlined as possible through the recommendations in this report. It mentions how the research could be sustainably financed and supported over its lifecycle –applicable to other research institutions and topics.

* **Department of Trade and Industry Industrial Policy Action Plan**

Our maritime education providers can assist the pharmaceutical industry target of 350 jobs and R1.5 billion through research in marine contact, ecosystems, seaweed/aquaculture products, maritime health and psychology or human factors. In particular local products/species could be tested for medicinal purposes and commercially developed. Agro-processing could benefit similarly for agriculture and aquaculture techniques. Campuses could aid business and communities through access to lectures, courses, training, seed capital, special facilities, an extension service, experience, IP and funding advice, marketing, business and technology. Research into marketing, logistics, maritime business, economics, law and even shelf extension life –can aid agriculture and other exports. It could link to the Black Industrialist’s Programme, SEZ’s, export support and BEE. The metal fabrication industry, green and textiles industries may also gain. It could provide markets for the recently intervened steel industry. Given skills and funding constraints, it is logical for research to multi-task –such as for engineers. Relaxing immigration restrictions, delaying retirement, discouraging emigration or expanding places can further benefit the maritime education sector if they work in cooperation with government.

* **Home Affairs Strategic Plan 2015/2016-2019/2020.**

Maritime education, research and training could implement this plan further through cooperation over migration control. Improved maritime security, law enforcement, customs, technology, naval training, seafarer cooperation and even other species via marine contract and ecosystems along with maritime risk monitoring could improve governance over our oceans not just our land borders.

* **International Relations and Cooperation, Revised Strategic Plan: 2015-2020**

Investing in maritime education through increasing international student market share, providing research, consultancy services, specific events, exhibitions, joint partnerships and other initiatives throughout Africa, benefits SIP 19. It further aids the Departments core objectives as provided in the specific African Renaissance and International Cooperation Fund. This offers maritime opportunities to assist African individual, regional and continental values of patriotism, loyalty, Ubuntu and dedication. Developing local cabotage/shipping fleets, cruise and marine tourism reserves, law enforcement capacity, technology, aquaculture, seafarers, upgraded ports, maritime finance and education campuses promotes human resources and socio-economic development. Customs, maritime law, business and logistics benefit across other economic sectors. This simultaneously solidifies NEPAD and the African Renaissance ideals via AIMS

* **National Tourism Sector Strategy 2017**

Aside from marine and coastal tourism objectives, the maritime knowledge economy could aid this strategy’s intentions via Pillar One: Effective Marketing. Pillar Two facilitates ease of access –i.e. tourism visas. Pillar Three focuses on the Visitor Experience and Pillar Four on Destination Management.

* **Water and Sanitation Strategic Plan 2015/2016-2019/2020.**

Both this and the National Infrastructure Plan call for improved access, availability and security of water resources. Each existing borehole, dam, aquifer and water source could benefit from improved aquatic security, conservation and engineering (Research Area 2.2). Project examples include the Lesotho Highlands Scheme and the DRC Congo hydroelectric scheme –benefitting our own engineering, construction and consultancy industries. Given droughts and heatwaves are projected to be South Africa’s most immediate and costly climate change, disruption risk; water security is paramount. This report proposes to extend beyond considering the maritime sector as ocean only. Given the potential for ocean renewable energy, desalinisation, implications of existing water sources on oceans, marine ecosystems, ports and communities; this report proposes connecting all core stakeholders. Those such as water engineers, SAIMI, the Water Research Institute, state, municipalities and water boards could partner each other on the plan’s ‘War on Leaks.’ Plan Programme 2 considers water planning and information management. Program 3 selects infrastructure management, 4 – water and sanitation services and 5 –water policy regulation. It can assist the 2020 Vision for Water and Sanitation Education Programme and Municipal Area Reconciliation Plans. Each water source needs surveying, watershed management, ecosystem species monitoring, testing and evaluation –to charter and protect all water resources, capturing, storing and distributing rain water more carefully. From the Nile to the Niger/Gambia, to the Okavango Delta to Lake Malawi and the Great Lakes, our economy, education and research sector can benefit Africa –aiding SIP17 as well.

## CHAPTER 26: COORDINATING STAKEHOLDERS AND INSTITUTIONS

Information overload… With limited time and resources, stakeholders seek to filter, to prioritise so they can adapt and react. People seek to live their own lives. Operation Phakisa and maritime education are no different. 300 report pages summarises but the quintessence fraction of what exists. The challenge is how to prevail to ensure this actually passes so stakeholders coordinate and know what to expect. They know what is intended and how they can contribute. Uncertain psychological expectations perpetuate uncontrollable impact, maladaptation and opportunity costs so our African destiny is determined by others. Problems exist when isolating people from the resources, experience, incentives and potential that exist, whether through information depletion or overload!

**RECOMMENDATIONS**

This report proposes the need to coordinate all stakeholders, institutions, achievements and efforts to establish Operation Phakisa. Given its ambitious targets and current failures, it is necessary for the maritime sector to create means to interlink multiple existing and future associations, information, funding, research, and stakeholder and institution sources to succeed. SAIMI or an equivalent could coordinate all maritime education, training, research, experience and related stakeholders. Campuses could provide past papers, films and podcasts for students to prepare. Voluntary student research profiles and CV’s would publicise their presences to prospective stakeholders to merge supply with demand. Centralised maritime electronic and physical archives/libraries would stimulate more ambitious involvement as people’s offerings are preserved as legacies. The Presidency and Department of Economic Development (or equivalents) could extend beyond its existing guidance of the maritime economy and policy framework. Greater centralisation of the following is necessary so stakeholders can swiftly access the tools necessary to act.

**I: Awards, Prizes and Scholarships**

**II: Centralised admissions/enrolment system**

**III: Centralised job board/CV uploading system**

**IV: Conferences, News and Events**

**V: Education qualification and training service providers**

**VI: Employability skills and careers advice**

**VII: Funding opportunities**

**VIII: Information and research output/profiles of researchers**

**IX: International links**

**X: Maritime stakeholders contact directory**

**XI: Opportunities, resources and other information identified in this book**

**XII: Policies and legislation**

**XIII: Professional associations contact list**

**XIV: Publishing and journal opportunities**

**XV: Films, podcasts and cultural efforts**

Online forums could be created to debate and notify others on affairs relating to maritime issues. Providing the above could encourage greater awareness, understanding, appreciation, involvement, effort and chances. It filters information credibly to where it can be most effectively utilised. It may require an initial allocation of modest time, resources and a few administrators to ensure professionalism with credibility. However, the more people become part of Operation Phakisa, the more they may voluntarily self-sustain this. To succeed though, coordination needs to be pursued by the professionals concerned –as well as the targeted community and individuals. This necessitates regular updates and responses to valid, productive contacts. Each stakeholder needs to connect, participate, contribute and publicise when and where possible. Existing stakeholders may protest, mentioning such resources exist. Yet people remain ignorant. Chances go missed. Such grand initiatives may often be set up but coordination efforts are seldom maintained. Information needs condensation and classification so those who can contribute, know precisely when and where to go, why, how and which will achieve their intended outcome for Operation Phakisa. Future generations can be spared trudging through hundreds of hours of work as for this prototype research source.

## CHAPTER 27: EXISTING MARITIME EDUCATION –SOUTH AFRICA’S POTENTIAL ALLIES AND RIVALS

Currently, very few African countries offer any form of specialised maritime education and training. Only the Regional Maritime University of Ghana and the University of KwaZulu Natal Unit for Maritime Studies in Durban South Africa– (one of the most significant southern hemisphere ports for maritime related economic activity), offer highly professional postgraduate academic training, degree and research education, while diplomas/ degrees are offered at the Cape Peninsula University of Technology, Durban University of Technology and Nelson Mandela Metropolitan University. Seafaring/vocational based courses are conducted at the SA Maritime College and Transport School. Despite the scarcity of skills and the prospects for potential employment, there is a significant dearth of African higher education competitors and professional port training schools outside a few such as the Bandari College in Dar es Salaam, Tanzania, the Alexandria School of Ports and Durban based Transnet School of Excellence –and the handful of places are normally already reserved. Even the private sector has ignored the dearth in skills and the need to empower potential African graduates rather than training them abroad as the Kenyan Ports Authority indicated to me in August 2014, lacking the capacity to train local pilots

Until we develop full academic autonomy in every emergent maritime research area promoted by this report; we will not be able to germinate an African ocean economy hegemony. Given our deficits; this chapter identifies and evaluates the state of existing maritime education facilities, beyond South Africa and Africa. It briefly determines the potential relevance and value of each to our country and continent’s interests as an area vitally ignored by SAIMI, the Presidency and the central stakeholders/policy documents of Operation Phakisa. Whether we consider them as competitors, allies, sources of recruitment, experience or even to simply ignore… it is essential not to ignore or marginalise their existence or the possibilities they present as significant risks. We could strengthen partnerships, gaining new insights, resources, research, students, faculty and experiences.

The most significant current forum for maritime education is the International Association of Maritime Universities (IAMU) established in November 1999. Its aim is to support, publicise and cooperate international efforts in maritime education, training, research and policy. However, the African member is the ‘Arab’ Academy of Transport in Alexandria, Egypt. For Africa to be considered a true maritime academic and economic power this report considers it imperative to replace this Arab connection and emphasise our maritime universities, academies, colleges, facilities, industry, clusters and stakeholders –whether existing/SAIMERI or new. These need to be portrayed as (and become) the most illustrious centre of maritime scholarship, training and development across the African continent. Eventually we need to out-compete the others as the most significant in the Southern Hemisphere/BRIC’s nations. The 60IAMU current members plus the Nippon Foundation are summarised in Table 27.1.

Table 27.1: IAMU Global Maritime Education Institutions

|  |  |
| --- | --- |
| * Arab Academy for Science and Technology and Maritime Transport | * Department of Shipping and Marine Technology, Chalmers University of Technology Sweden |
| * Australian Maritime College | * Dokuz Eylül University, Maritime Faculty Turkey |
| * Cardiff University | * Istanbul Technical University, Maritime Faculty Turkey |
| * Polytechnical University of Catalonia, Faculty of Nautical studies, Barcelona | * Karadeniz Technical University Turkey |
| * Istanbul Technical University, Maritime Faculty | * Kyiv State Maritime Academy Ukraine |
| * Kobe University, Faculty of Maritime Sciences | * National University Odessa Maritime Academy Ukraine |
| * Maine Maritime Academy | * Odessa National Maritime University Ukraine |
| * World Maritime University | * Liverpool John Moores University UK |
| * Azerbaijan State Marine Academy | * Southampton Solent University UK |
| * Nikola Vaptsarov Naval Academy Bulgaria | * Dalian Maritime University China |
| * University of Rijeka, Faculty of Maritime Studies Croatia | * Jimei University China |
| * University of Split Faculty of Maritime Studies Croatia | * Shanghai Maritime University / China |
| * Svendborg International Maritime Academy Denmark | * Tianjin University of Technology, Maritime College China |
| * Estonian Maritime Academy of Tallinn University of Technology Estonia | * Academy of Maritime Education and Training (AMET) University India |
| * Satakunta University of Applied Sciences / Finland | * IRISL Maritime Training Institute Iran |
| * Batumi State Maritime Academy Georgia | * Tokyo University of Marine Science and Technology, School of Marine Technology Japan |
| * HSB City University of Applied Sciences, Centre of Maritime Studies Germany | * Korea Maritime and Ocean University Korea |
| * Hochschule Wismar, University of Applied Sciences – Technology, Business and Design | * Mokpo National Maritime University Korea |
| * Jade University of Applied Sciences Faculty of Maritime and Logistics Studies | * Myanmar Maritime University Myanmar |
| * Maritime Institute Willem Barentsz NHL University of Applied Sciences Netherlands | * John B. Lacson Foundation Maritime University Philippines |
| * University College of Southeast Norway | * Maritime Academy of Asia and the Pacific Philippines |
| * Gdynia Maritime University Poland | * Far Eastern State Technical Fisheries University Russia |
| * Szczecin Maritime University Poland | * G.I. Nevelskoy Maritime State University Russia |
| * Constanta Maritime University Romania | * Ho Chi Minh City University of Transport Vietnam |
| * Mircea cel Bătrân Naval Academy Romania | * Vietnam Maritime University Vietnam |
| * Admiral Makarov State University of Maritime and Inland Shipping Russia | * California State University Maritime Academy USA |
| * Admiral Ushakov Maritime State University Russia | * Maine Maritime Academy USA |
| * Baltic Fishing Fleet State Academy of Kalingrad State Technical University Russia | * Massachusetts Maritime Academy USA |
| * King Abdulaziz University Jeddah, Faculty of Maritime Studies Saudi Arabia | * State University of New York, Maritime College USA |
| * Fisheries and Marine Institute of Memorial University of Newfoundland Canada | * Texas Maritime Academy, Texas A&M University Galveston USA |
| * Mexican Maritime Education and Training System Mexico | * U.S. Merchant Marine Academy USA |

* **Arab Academy for Science and Technology and Maritime Transport**

Whilst previously reviewed under African education; this institution founded in 1970 presents one of the few local rivals or collaborators for maritime education. However, its interests are Arab rather than African centred, despite being the IAMU designated emissary for Africa. It has capacity to graduate 500 students annually and specialises in seafaring/practical maritime education, science and technology. It offers the International Computer Driving Licence, with an Egyptian and Arab Informatics Olympiad. It could assist South Africa/Africa in maritime security/cybersecurity, seafaring, marine engineering, navigation and specialised simulators investigating numerous maritime risk scenarios and futures. It offers competing courses in Tourism, supply chain management and transport logistics. It links actively to the International Forum of Maritime Transport, the EU and STCW. Recent maritime related research includes promoting women in maritime education, the competitive advantage of seaports, implications of the Hong Kong Convention on Ship Recycling and marine spatial planning in the Arctic.

* **Australian Maritime College, Tasmania**

This institution is independently and credibly considered one of the foremost specialised maritime training and research institutions. Whilst providing a remote and limited campus existence/student experience; it does offer sophisticated, specialised maritime research facilities. These include a Cavitation Tunnel, Towing Tank, Autonomous Underwater Vessels, advanced Simulator Centre including Navigation bridges, Survival Centre, Model Test Basin, aquaculture facilities, engineering and naval architecture workshops. It offers training vessels, a circulating water channel and diesel spray test facility. It has numerous international students from its global reputation. Postgraduates –especially PHD’s are predominantly international, Tuition exempt and extremely constrained, PHD living allowance scholarships (below minimal wage) exist to students innovative enough to propose a topic. Its prime capacity to assist Operation Phakisa and our continent exists in seafaring; marine engineering; naval architecture, marine biology, conservation and ecosystems, aquaculture, ocean renewable energy/engineering, maritime human factors/health and Antarctic studies. It is a reasonable competitor in related maritime and logistics management. Other maritime areas are limited. Recent research projects include sending robots and autonomous vehicles underwater and ice along with testing offshore structures and vessels under extreme environment and climate conditions.

* **Cardiff University**

Given recent undergraduate student fees increases across the UK, this University offers greater postgraduate prospects for Africans through its M (Sc) in Maritime Policy and Shipping Management, highly rated as a business school. It focuses on shipping policy and related security, safety, environment and legal regulation concerns. However, limited UK funding options exist. It alternatively offers an LLM in Maritime Law. This differs from UKZN with courses in law of the sea, commercial law, refugees, health, commercial arbitration, human rights and EU trade policy. It invented the UK’s B (Sc) qualification in Marine Geography as early as 1976 with abroad experience opportunities. It offers competitor courses in logistics management and a specialised Seafarer’s International Research Centre for prospective collaboration. Our African seafarers could gain from enhanced physical and psychological health, improved environmental conditions, implications of multinational exposure, globalisation, automation, social and family isolation along with other risks.

* **Polytechnical University of Catalonia, Faculty of Nautical Studies, Barcelona**

This faculty offers Batchelor degrees in Marine Technology plus Nautical Science and Maritime Transport. These expect thorough foundation courses in mathematics, maritime Technical English, physics and information technology. Technical craft inspection and naval electronics courses are required. It offers an undergraduate degree in Naval Engineering and Technology Systems for electric facilities, marine systems plus the construction and repair of ship structures. They can specialise in yachts and recreational boat design or ocean energy/engineering sources. It possesses minor rival areas in maritime logistics and trade, maritime law and communications. Contemporary research projects that could be linked to Operation Phakisa include Monitoring and Operation Services for the Motorways of the Sea (MOS4MOS); Multi-modal Interoperability E-Services for logistics and environmental sustainability (MIELE) and NAUPLIOS: Improving Maritime Safety and Surveillance. This could project greater, African ocean governance and sovereignty. PHOENIX (Identification and Quantification of the Variables and Parameters That Aid in Evaluating Risk Fire on Board Ships in Accordance with Their Condition); could especially aid our own fleets under cabotage. The Ten-T Project enables vessel systems to coordinate and share information more accurately and effectively.

* **Istanbul Technical University, Maritime Faculty**

With a maritime education history dating back to 1884, this University possesses constraints for prospective students expected to conform to rigorous regulations and mandatory uniforms. In particular it presents options to partner with our institutions as its faculties specialise in marine engineering and naval architecture; which our own current capacity lacks. Its expertise originates directly from the Ottoman Empire Naval Engineering School of 1773, possibly one of the most venerable global institutions. Research projects that could complement our own African interests include designing offshore structures, pipes, underwater acoustics, vessel construction and improvement; oceanography and surveying.

* **Kobe University, Faculty of Maritime Sciences**

Formerly known as the Kobe University of Mercantile Marine, the Asian delegate of IAMU represents Japan’s most prestigious maritime education specialist; in one of the world’s leading commercial shipping fleet, construction and port expertise. As with other Japanese universities, generous scholarships exist for those who survive the hyper-competitive examination process, pass the medical and are willing to learn the Japanese language/culture as initial screening. It was founded in 1917as the private Kawasaki Merchant Marine School, nationalised as Kobe University in 1920. It restricts itself to three faculties of global reputation: Departments of Maritime Technology Management, Maritime Logistics Sciences and Maritime Engineering. The former trains seafarers (Nautical Science). Maritime Engineering graduates can become officers via a 6 month course. One of the most advanced global curriculums incorporates mechanical drawing, thermodynamics, navigation, propulsion, IT, mechatronics, fluid and material mechanics, control theory and electronics. It extends to fuel, combustion, turbo processes, manufacturing processes, nuclear systems, naval architecture, marine facilities and deck skills. Its specialised campus facilities host an International Maritime Research Centre, a Maritime Museum, training vessels, a Ship Model Basin, simulators, a Sea Training Centre, a Tandem Electrostatic Accelerator and even a Hyper-Cryogenic Laboratory. It has academic partnerships with 21 other institutions but none from Africa, the Caribbean, Middle East or South America. In particular it could work with our South African maritime institutions to develop Southern Hemisphere/African capacity and expertise with arising research areas. For example it concentrates on human elements management, maritime risk and environment management, transport and information systems planning, mechatronics design, automation and robotics, cybersecurity and maritime simulation engineering.

* **Maine Maritime Academy**

This academy created in 1941 is the IAMU representative for the Americas. US maritime education is based predominantly on seafaring or technical maritime vocation for the navy or mercantile marine to serve its domestic cabotage requirements of the Jones Act. It offers minimal theoretical research or applied projects, practically orientated. Situated in Castine; it provides thorough professional guidance but prospective international students have to contend with being situated in a remote, obscure small town and campus with minimal facilities. This characteristic applies to all seven of the foremost training maritime schools in the USA, the Mexican system and 2 Canadian specialised universities Midshipmen regiment participation is part of certain courses –especially if seeking coast guard experience as well. It requires 5 years for a Bachelor including 180 sea days as a minimum. Its main potential to Operation Phakisa consists of collaborative partnerships, especially in naval architecture, marine or power engineering. Its facilities include a small-scale operating steam plant, a power plant simulator, diesel engine and control room simulator. It hosts electrical power, machine tool and welding/testing laboratories. Its seafarers with courses in Marine Transport and Small Vessel Operations gain from a diversity of vessels –training vessels, schooner, tug, barge, sailing and other boats. It possesses minor expertise in marine environment studies.

* **World Maritime University**

Founded by the UN in 1983 in Sweden, with a Dalian and a Shanghai campus, this has established itself as the premier maritime university in the world, with the highest proportion of funding, global reputation, distinguished faculty, influential research, networking opportunities, policy formation –and a notable proportion of Africans. As faculty or as students, many have benefitted from specific African government scholarships and support as we lack equivalent investments, places and opportunities across our own South African country and continent. As chapter 24 identifies, these opportunities could be significantly exploited and prioritised. The university website boasts of over 4300 graduates from 166 countries, which other maritime campuses cannot compete with for impact. It specialises in postgraduate studies –offering M (SC’s) and PHD’s, Postgraduate Diplomas, LLM’s and M (Phil’s). It doesn’t offer undergraduate studies. Given the significant costs of students abroad, if our stakeholders send student’s abroad it should be to specialise in areas we do not possess the capacity for and then, a service/return country or continent obligation should be a condition of allocating precious foreign exchange.

Its core capacity to assist Operation Phakisa is through its specialisation in maritime education, energy management, law and policy, maritime safety and environment administration, ocean governance/sustainability, port and shipping management. It has partnered with Malta’s International Maritime Law Institute. Existing professional industry courses include Container Terminal Performance & Planning; Contemporary Environmental Issues in the Maritime Industry; Contemporary Issues in Integrated Coastal Zone Management; Dangerous Goods; Developments in the Maritime Labour Convention and Economic Modelling of Shipping Markets. Others include Executive Developments in the Maritime Sector, IMO Ballast Water Management Convention Models, IMO Ship Energy Efficiency Management Models, Climate Change Impacts on the Maritime Sector, Information & Communication Technologies (ICT) in MET, International Safety Management Code and International SPS Code. More options include International Trade & Transport, Law of the Sea, Maritime Casualty Investigation, Maritime English - Upgrading Teaching Competencies, Offshore Reception Facilities, Port State Control: Building and Refreshing Skills, Protection and Preservation of the Marine Environment. It includes Ship Finance and Investment. It incorporates international field research and exchanges to grant greater experience, exposure and contacts for its students

Europe and Africa (33 members)

• **Azerbaijan State Marine Academy**

Created in 1881, this academy focuses on professional seafarers and a navy navigation facility. In 2000, the Centre for Sailor’s Development and Certification was formed. However, it has 1300 students but only 28 international –all from neighbouring countries, despite European and Asian partnerships. It is fee exempt but taught in the Russian and Azerbaijan languages, constricting African applicants. Undergraduate and diploma courses include logistics, management and various engineering options (shipbuilding, ship repair, electrical, naval navigation, transport construction/planning, electronic and process automation). It possesses ship mechanics and electrotechnical workshops. Its recent projects have worked with government to improve and coordinate maritime policy, transport and port related infrastructure. It investigated vessel impacts on Caspian Sea and local ecosystems and improved ship valves, steam boiler efficiency/ship electrical equipment. However, it only produced 18 research output in 2013/2014 and 12 in 2014/2015.

**• Nikola Vaptsarov Naval Academy Bulgaria**

This academy has over 2000 students, 114 academic staff and three faculties in Navigation, Engineering and Postgraduate Studies, neglecting many of the areas competitively proposed by this report. It specialises in marine and electrical engineering, logistics, shipping, fleet and port operations. International students are expected to complete a 9 month course in Bulgarian, English, Physics and Mathematics. Our African maritime education facilities could also benefit from its Rescue Sim and Incident Management Simulators. Seamanship and celestial navigation would be improved via access to a planetarium as this Naval Academy includes; or our observatories. Unlike Africa it has strong industrial and naval contact links along with the Institutes of Oceanography plus Hydro and Aerodynamics.

**• University of Rijeka, Faculty of Maritime Studies Croatia, University of Split Faculty of Maritime Studies Croatia**

In 1866, the Austro-Hungarian Naval Academy started as the direct ancestor of the present University of Rijeka faculty. A critical evaluation is hindered due to technical website issues on frequent occasions. In contrast, the University of Split faculty derived from the 1959 Sea Maritime School. It has a maritime systems and processes, maritime yacht and marina technology, maritime management, nautical, marine and marine electrical engineering/IT departments. South Africa’s SAIMI or equivalents could learn from its example of hosting regular maritime seminars, lectures, an annual International Maritime Science Conference and publishing a journal – ‘*Transactions in Maritime Science).* We could similarly benefit from establishing similar facilities including an electrical laboratory, a GMDSS simulator, a nautical and shipyard simulator. It has partnered with over 25 institutions –none beyond Russia/Europe.

**• Svendborg International Maritime Academy Denmark**

This academy offers limited prospects for African students, primarily existing to satisfy Danish merchant marine and naval requirements, despite over 700 places and 70 academic staff. It specifically concentrates on officer training requiring standard land theory and sea training. Given MAERSK operates one of the three largest shipping fleets in the world our seafarers might benefit from formal exchange partnerships or other agreements. Specialised courses include automation, simulator training, maritime security and legislation, pilot training, hydraulics, radio course, assessment, recovery, trouble shooting, maritime combustion engines, innovation and entrepreneurship. It has advanced bridge and engine mission simulators (Sulzer RTA-84, MC-90 IV, M22-Pielstick), radar, Graphic Training, Transas ECDIS and 120. Capital investments in simulators may be expensive but given a scarcity of domestically registered ships and local company arrangements, they partially offset this deficit for our seafarer trainees and prospective graduates.

**• Estonian Maritime Academy of Tallinn University of Technology**

This was formed as 2 separate yet traditional classes in navigation and naval engineering in 1919, merging in 1935 as a school. In 1945, a fisheries section was added. It primarily concentrates on Estonian rather than European or international maritime interests and training requirements. Specialised campus facilities include mechanical and diesel laboratories. It utilises fleet, engine room, refrigerator, radio communication, GMDSS, trawling and crisis management simulators. Aside from IAMU, it links to the IASST (International Association for Safety and Survival Training), THS UK (The Hydrographic Society UK) and BIMCO (Baltic and International Maritime Consultative Organization). However, it appears to not favour academic partnerships with other maritime academies and departments. It offers postgraduate qualifications and specialises in maritime communications, simulators, security, firefighting and crew training. Its Research and Development Centre appears limited, mentioning only 4 projects GO LNG, RTF (Real Time Ferries), MSPDAT –Spatial Data Infrastructure and BOOSTED (Boosting Tourism Through Higher Vocational Education).

**• Satakunta University of Applied Sciences Finland**

The maritime faculty offers places to 1500 students primarily at undergraduate level in Navigation and Ship Handling, Shipping Technology and Shipping Economics, Seamanship and Leadership Skills,

Ship Service and Maintenance plus Ship Building. It includes, Ship Engines and Technical Systems,

GOC, Maritime Law and Legislation plus Ship Safety and Emergency Management. 36 Master’s positions exist in Marine Technology, Management or Engineering. It requires a multiple-choice test and interview for student admissions. Its emergent areas of research priority include intelligent water and energy technology; logistics, tourism, automation and implications of aging maritime labour force.

**• Batumi State Maritime Academy Georgia**

Since 1929, this maritime academy developed from offering community courses and as a technical high school then college in 1944. It gives our maritime institutions an alternative maritime partnership course that views education beyond just formal shipping, industry and government expectations. Its maritime faculty includes electrical-mechanical vessels, port, ship and terminal equipment, naval navigation and ship mechanics. However, its Business and Management Faculty select port management, cruise tourism plus maritime transportation organisation and logistics. It too competes with our schools via its Seafarer’s Training and Certification Centre. It doesn’t appear to prioritise applied research, publications, commercial and other partnerships.

**• HSB – City University of Applied Sciences, Centre of Maritime Studies Germany**

Maritime Studies forms just one small part of this university’s 66 separate courses. It offers Africa’s graduates international B (SC) programmes in Shipping and Chartering or Ship Management, Tourism Management, Environmental Engineering, Naval Architecture and Ocean Engineering. It offers a Master’s in Shipbuilding and Maritime Engineering. Although most research is not specifically maritime orientated, the university includes IFES - Institute for Experimental Statics, IIA - Institute of Informatics and Automation along with IWA - Institute for Hydraulic and Coastal Engineering, with related applications.

**• Hochschule Wismar, University of Applied Sciences**

This school began in 1908, eventually developing as part of an integrated new technical university in 1992. Unusually it offers a bi-national German-Indonesian Bachelor course in Marine Engineering, partnering with Institute Teknologi Sepuluh Nopember (ITS) in Surabaya, Indonesia. South Africa/Africa could investigate this with other credible, global maritime institutions summarised in this chapter. The University offers a Master’s degree in the Operation and Management of Maritime Systems. This has elective modules in a diversity of areas vital to Africa’s maritime future. Areas include Safety, Security, Ecology, Maritime Ecology, Business and Communications, Management, HR, Shipbuilding, plus technical, Integrated Manoeuvring/Propulsion and Navigation Systems Again international students face prospects of a small remote German town with limited campus life and few to share the experience. To survive and succeed it has partnered with local high schools,

. It also trains hydrographic surveyors. It offers undergraduate and Master’s municipalities, state and national governments, industry and professional associations. It links to cruises, publishers and multiple foreign and local universities.

**• Jade University of Applied Sciences Faculty of Maritime and Logistics Studies**

The German University was only recently established in 2009 with campuses in Elsfleth, Oldenburg and Willemshaven. It offers undergraduate and postgraduate degrees in International Maritime and Logistics Management, marine sensor technology, sea engineering, nautics, maritime transport, maritime and port services under its faculty. Its partnerships concentrate on Europe and China with no Southern contacts. Contemporary maritime research projects that could be developed for Africa included secure, autonomous maritime systems; maritime English training standards; ship dynamics; green shipping; hybrid freight sailing; integrated ship control planning and manoeuvring systems.

**• Willem Barentsz Maritime Institute, NHL University of Applied Sciences Netherlands**

Rotterdam port is one of the most significant of all European ports and the Netherlands represent another nation with centuries of practical shipping experience for South Africa to learn from. This institute has over 600 students taught in English/Dutch and is less challenging for African students to access than Asia’s language requirements or the US’s service/citizenship/martial requirements. It competes in graduating seafarers and officers using simulators, degrees as a Maritime Officer, Engineer, Technology specialist or in Marine Shipping Innovations. It offers professional courses in DP induction, simulation and shuttle tanker service. Alternative courses include advanced polar ice water training, tug action; oil and chemical spill responses; sea time reduction; applied electro-technics, ship handling and yacht construction. Its Maritime Knowledge Transfer Centre concentrates on oil and LNG control research, reduction of work pressure, maritime safety and port state control. It encompasses marine environment and safety management, law and environment. As our maritime capacity develops; Africa’s maritime industry could equally develop Sea Traffic Management Systems.

**• University College of Southeast Norway**

The University itself hosts 1500 staff and 18000 students with a more limited maritime component. It offers postgraduate qualifications in Maritime Management, Electrical and Automation Engineering, Subsea Systems along with Nautical Operations. Limited information exists covering its existing research/academic capacity, specialised resources, extensive experience and maritime related affairs for Africa’s students and stakeholders.

**• Gdynia Maritime University Poland**

The Maritime School and its training ship were founded in 1920. It has a Department of Electric, Navigation, Mechanical Engineering, Entrepreneurship and Commodity Science. Its maritime research is assisting the EU in its Horizon 2020 and blue economy equivalent to Operation Phakisa. It has expertise in successful leveraging connections to gain over 25,000,000 euros across 72 projects in the past decade. Its successes include refinements of telematics and e-Navigation systems, climate change, modern ship materials, automated ship traffic systems; diesel engines and marine turbine, marine propulsion systems, food quality including aquaculture plus international trade. It is targeting the implications of climate change on critical infrastructure for the EU. It is working on efficiently coordinating smaller ports into supply chains. It is aiming for a holistic, integrated environmental and safety system for supply chains. The University operates on a system of 20 circles designed to coordinate joint efforts from individual student/staff initiatives to progress concepts further. It provides specific grants to help aspirant young researchers. It has international partnerships with 17 universities –none in Africa.

**• Szczecin Maritime University Poland**

With over 4000 students (300 international), this university offers more places than most for our students. Specialised facilities comprise 16 impressive simulators: Marine Centrifugal Pumps, Ship Handling, Anti-Collision ARPA, Electronic Chart Display and Information System (ECDIS), Vessel Traffic System (VTS) and Satellite Communication System– GMDSS. It adds a Hydro-Acoustic Simulator, Autopilot, Radar, Cargo Handling Fishing, Operational Engine Room, Graphical Engine Room, Refrigeration and Marine Centrifugal Pump's Simulator. It presents a Full-Mission Bridge Simulator with several virtual bridges and Engine Room Simulator. It has attracted over 18 million euros recently in research funding (2007-2013). It has Marine Officer and Rescue Training Centres, directly competing with SAMSA/others on maritime safety and seamanship. A Maritime English Centre exists and a Department of Foreign Languages. This is another aspect our maritime institutions will need to consider if we are to produce globally competitive crews and other specialists. Whilst the International language of trade and shipping may be Standard English; increasing globalisation has produced ever increasing polyglot, multilingual crew, academics and students. The Departments have even published standard handbooks and textbooks with maritime themes. It also has its own Scientific Publishing House. It hosts a European LNG Training Centre –to familiarise those with an alternative to the externality costs of traditional fuels.

The University would make an excellent partner for research, technologies and ideas both current and future via its Maritime Technology Transfer Office. Its faculties of navigation, marine engineering, economics and transport engineering cover logistics and transport; space and ICT, (encapsulating The Internet of Things, production telematics and advanced quantum or biological computing.) Mechanical engineering and mechatronics extend to advanced materials, nanotechnology, ship to grid electrical systems, automation, robotics and material diagnosis. It is targeting renewable and low carbon energy, energy efficiency, smart cities and responses to oil spills/other risks. It also contributed to GO LNG, reducing marine litter and hybrid sailing vessel design and technology. It is pioneering work in offshore cruising, deep sea mining, marine information and salvaging

**• Constanta Maritime University/ “Mircea cel Bătrân” Naval Academy, Romania**

Constanta was founded as the Institute of Civil Marine in 1990, becoming a maritime university in 2000. It holds a Faculty of Electromechanics and one in Naval Electromechanics. Present capacity is highly constricted for international students with only 100 places for each faculty and the local language requirement. In 2011 a separate degree –Engineering and Environmental Protection in Industry was offered to 90 students. However, in 2013-2014 it offered courses to 74 Nigerian students in English. In contrast Mircea cel Bătrân” Naval Academy is restricted primarily to those seeking a professional career related to the Romanian navy, practically oriented with minimal offerings for our continent’s progress.

**• Admiral Makarov State University of Maritime and Inland Shipping Russia**

Limited information exists about this maritime university on its website –common issue of all Russian universities except Admiral Ushakov. It concentrates on maritime research relating to shipbuilding/ship repair; automation and transport planning; hydrography, telecommunications, navigation and water transport economics. However, it does indicate possibilities for our institutions to list information about our scientific research output, projects, funding, publications, patents produced and conferences. It distinguishes sections between cadets and students, mariners, employees, industry, stakeholders, hydraulic engineers, equipment specialists and other maritime stakeholders.

**• Admiral Ushakov Maritime State University Russia**

Russia’s most elite and credible maritime education facility originated in 1974. It has over 4000 students and 300 faculty with campuses in Rostov on Don, Sevastopol and Astrakhan. It provides a specialist library of over 300,000 volumes, 5 faculties (Military Training, Engineering, Navigation, Correspondence plus Economics and Management) and 36 departments with 21 simulators and 12 ship equipment mini simulators. It hosts the Sedov Institute of Water Transport. South Africa could learn from its practises of linking to specialised maritime high schools/colleges. The Navigation Faculty has developed automated remote monitoring of vessel conditions, improved navigation, bunkerage, geometric modelling and legal support of public-private partnerships.

**• Baltic Fishing Fleet State Academy of Kalingrad State Technical University Russia**

Created in 1966, this academy specialises in fisheries and hosting a Baltic Centre for Marine Vocational Education, the Kaliningrad Maritime Fishing College, the Baltic Centre of Maritime Education and the Institute of Professional Pedagogy. There is a Department of English Language, Navigation, Navigation Safety, Higher Mathematics, Transport Management plus Theory of vessel exploitation and Commercial Fishery. It includes seafaring, maritime security and safety training. Courses include Transportation of hazardous substances on ships (in bulk and packing); Transport of hazardous substances and Ship's Engine Room Simulator. They include energy conservation and organization of running machinery, labour safety on sea vessels, maritime risk assessment and marine ship security officer. It adds emergency crew response training plus essential skills. The Radio Technical Faculty comprises departments of marine radio-technical systems, information security, information technology and physics and chemistry. The Faculty of Marine Engineering consists of departments of mechanical engineering; ship power plants; materials technology and measurement science; refrigeration, cryogenic technology and life support systems along with electrical and automatic equipment of vessels

**• King Abdulaziz University Jeddah, Faculty of Maritime Studies Saudi Arabia**

Although the creation of the maritime faculty is not detailed, the University was established with a few dozen students in 1967. Its website now professes 82,152 students –one of the more significant of global universities. However international students primarily derive from Northern Africa/Middle East rather than Sub-Saharan Africa and beyond. Its faculty concentrates on surveying, nautical science, ports and engineering as traditional areas with limited applications for South Africa/Africa to consider full collaborative partnerships or concentrate on sending students. However, as an ancillary concern to aid maritime scholarship, contact can be attempted even if not prioritised as for more distinguished institutions.

• **Department of Shipping and Marine Technology, Chalmers University of Technology Sweden**

This University offers African applicants undergraduate degrees under marine engineering, ship master, maritime and logistics. It offers Masters’ in Maritime Engineering, Maritime Management, Ocean Engineering and Naval Architecture. Its courses include STCW, human factors, medical, nautical, languages and cargo operations. Its facilities include Nautical Operations Studio, Cargo Operations Studio, GMDSS, Engine Operations, Full Mission Bridge Operations, Scrubber and DB Simulators. Whilst highly concentrated and limited in its areas of study; it offers Africa’s own maritime researchers the future chance to learn from projects including simulating applied forces in ship hull cleaning; heat transfer, general hydropower and a low energy wood stove. It could aid our continent to improve maritime cybersecurity, biofuels, shiphandling and Dynamic Fixed Position Simulators. Other opportunities of specific relevance include self-cleaning gas condensers, developments of marine propulsion systems, models to predict ship waves and spray break up plus technologies for innovative, intelligent rail or to substantially eliminate aircraft noise and emissions. It has produced low toxic befouling materials, floating wave power devices; vessel route fatigue and fuel optimisation and risk assessments of ship collisions with infrastructure (i.e. cyclone damage and Durban harbour). A recent paper even identified incentives for society to cooperate and support its maritime university. Our maritime education curriculums could integrate its course requirements for students to design practical structures, solutions, vessels, vessel parts, equipment, technology or software to specific maritime/transport scenarios. We could then develop intellectual property in partnership.

**• Dokuz Eylül University, Maritime Faculty Turkey**

The Faculty commenced in 1982. Although its courses are in English, it primarily concerns itself with Turkish rather than regional or global maritime requirements. It offers Departments of Maritime Business Administration, Maritime Engineering, Logistics Management and Marine Transport Engineering. It differs from many maritime faculties in offering joint degrees in partnership with Maine Maritime Academy. It competes rather than complements Africa’s maritime training capacity offering similar courses related to maritime business and seafaring including STCW. It has similar facilities, equipment and infrastructure e.g. computer laboratories, a Radar Navigation, Navigational Aids and GMDSS Simulator. In addition it has Survival at Sea, Basic Seamanship, Basic Navigation, Electronic Communications and Marine Engineering Laboratories. It does offer students the intriguing concept of a Maritime Club founded by students to help them concentrate on networking, employability skills and partnering with maritime industry.

**• Karadeniz Technical University Turkey**

The University dates to 1955. Its maritime section is a Faculty of Marine Sciences with Departments in Fisheries Technology Engineering, Naval Architecture/Marine Engineering and Maritime Transport/Management Engineering. Aside from engineering and seafaring it could particularly aid Operation Phakisa through improved aquaculture. Standard campus facilities are limited to a Maritime Safety Training Centre, a full mission bridge, GMDSS, tanker, marine engines, navigation and seamanship simulators with courses in safety at sea and first aid medical care with maritime chemistry and computer laboratories. It has a vibration laboratory. The university does not appear to prioritise international partnerships and is practically orientated not concentrating on diverse subjects, successful projects, publications and other traditional research output indicators.

**• Kyiv State Maritime Academy Ukraine**

This academy is limited to offering vocational training e.g. Bachelor degrees in Navigation and Ship Power Plant operations. It has five departments: Navigation and Ship Control; Marine Power Plants, Auxiliary Machinery of Ships and Their Operation; Technical Systems and Processes in Navigation, English for Professional Purposes and Natural and Technical Sciences. The Faculty of Economics and Transport offers the following Bachelor Degree Programmes: Management, Economics of Enterprises, Accounting and Audit, Transport Technologies and Software Engineering. Master Degree Programmes include Management of Enterprises and Administration Transport Management and Travel Industry Management), Accounting and Audit and System Software Engineering. The Faculty includes 7 departments: Economics and Management Department; Accounting and Audit; Transportation and Marketing, Information Technologies, Economic Theory; Mathematics Department and Physical Training. A Faculty of Law includes legal clinics and transport law. It accepts international students without service preconditions. Its areas of interest are practically orientated including energy efficiency, pollution reduction, renewable energy, information technology and resource management. But it does not offer individual examples nor evidence of existing connections to international universities and organisations.

**• National University “Odessa Maritime Academy,” Ukraine**

Ukraine’s Odessa ‘Higher Naval College” arose out of the USSR and World War 2 in 1944 to focus on vessel power plants, electrical systems, radio communications, naval training and navigation. It accepted international students as early as 1950 to satisfy regional maritime requirements. It developed into a university in 1958. In 1995, it added maritime law. It has developed partnerships with the UK Institute of Marine Engineers and World Maritime University. For Operation Phakisa, it offers collaboration options for shipyard, marine transport and technology; law and management; automation; electro-mechanics and radio-electronics. It hosts a Marine Lingua English centre to develop seafarer’s maritime linguistic capacity to compete internationally and a Survival Centre but offers limited research/publishing/funding and specialised facilities related to Africa’s requirements.

**• Odessa National Maritime University Ukraine**

Its predecessor (the Odessa Institute for Water Transport) was planned in 1930 with departments of ship operations, hydrotechnical and mechanics. It has an impressive, research expertise reputation since the 1930’s with applied scientific laboratories and workshops in heat, hydraulic, chemical, mechanical, electronic X Ray and other areas of engineering. Students played heroic/patriotic roles against invasion in World War 2. The university now hosts 31 departments with 480 faculty in tenure. It offers master, bachelors and specialist qualifications in Shipbuilding and Ocean Engineering, Ship Power Plants, Electromechanics, Transport Systems, Transport Technologies, Transport and Logistics Management. It offers Economics of Enterprise, Management, Hydrotechnical Construction, Law, Computer Science, Port and Machine Engineering. The one expectation for foreign students is they have to undertake courses in Ukrainian and Russian along with proving reasonable proficiency in mathematics, physics, chemistry, drawing and computer science, even if taught in English.

**• Liverpool John Moores University UK**

This university has a particularly prominent maritime reputation globally for its logistics, naval architecture and maritime engineering qualifications. African students’ further benefit indirectly from centuries of British maritime power and seafaring experience established globally. It offers a Master’s in Maritime Operations Management. This is relevant to our aims for an ocean economy, expecting modules: marine insurance; business and management; finance and economics; maritime law, operations research and research skills. It gives choices to study export trade law, global transport systems, information management and communication systems, international trade, logistics systems and maritime security. It adds port administration, port business strategy, project management and supply chain modelling. Its dedicated maritime facilities include a teaching and simulator centre –for bridges, engine rooms, technology and IT. There are materials science testing facilities, manufacturing laboratory, design studio and modelling workshop. It offers research into improving berthing and maritime risk management simulations. It competes in training international seafaring crews in a Maritime Training Centre. South Africa/Africa could learn from its initiation of a Maritime Knowledge Hub. This specifically responds to stakeholder commercialisation and consultancy needs. It formed a Maritime Business and Technology Incubator and Industry Centre. It regularly invites guest speakers from industry and even hosts formal/working lunches, regularly scheduled so stakeholders can connect and are aware of each other.

**• Southampton Solent University UK**

This university is only comparatively recently founded but the port itself has been one of the UK’s major maritime clusters for over 100 years. It primarily offers postgraduate alternatives for Africa’s graduates with an MSc in International Maritime Business/International Shipping and Logistics or an MBA in International Maritime Management. It offers degrees in Shipping and Port Management, Marine Operations, Marine and Marine Electrical Engineering –one of our scarcer skills. It offers a Maritime, Technology and Environment Research and Innovation Hub. There are acoustics and advanced manufacturing laboratories with marine engineering workshops. It has a fire school, medical training section and liquid cargo operations, engine room and bridge simulators.

**Asia, Pacific and Oceania**

• **Dalian Maritime University China**

Founded in 1909, this ranks as one of the more illustrious, Asian maritime universities which SAIMI and our own faculties could partner with. It received a campus of the World Maritime University and a MSc alternative to Sweden in 1985, formally becoming an entire maritime university in 1995. Its website proclaims turbine and navigation simulation laboratories, 2 ocean vessels, a museum and water survival training centre. It has capacity for over 20,000 students and 1346 faculty, teaching over 50 course types. Its English website however is garbled and not user friendly to navigate. Aside from its maritime college, it presents a College of Marine Engineering; Schools of Information Science and Technology, Transportation Management; Environmental Science and Engineering; Transportation Equipment and Marine Engineering, Law, Foreign Languages and Public Administration and Humanities. It extends to a Marxism College of Mathematics, Departments of Physics, Physical Education, School of Continuing Education, Advanced Institute of Transportation and Vocational Education Institute. It includes a Navigational Training and Research Centre, National Engineering Research Centre for Ship Navigation System, Institute of Maritime Development and one of Maritime Education. Undergraduate degrees are primarily in Chinese but graduate programs offer both. South Africa and the Chinese Government generally offer extremely modest and frugal scholarships – the latter’s condition is provided the applicant is willing to learn about Chinese culture, take the Chinese language and be prepared to have Marxism as a core part of whatever qualification is chosen. It has exchanged partnerships with at least 9 universities from the Americas, Japan, Russia and Europe.

**• Jimei University China**

Minimal information could be located on multiple efforts relating to this institution

**• Shanghai Maritime University China**

This university is similar to Dalian in requirements and reputation, coincidentally also founded in 1909, with over 20,000 students and 1000 faculty. These are present in Merchant Marine College, Colleges of Transport and Communications; Logistics Engineering (Sino-Dutch Mechanical and Electronic Engineering; Information Engineering; Arts and Sciences; Ocean Science and Engineering plus Foreign Languages. It incorporates a School of Economics & Management, Law School and Scientific Research Academy. It offers students 80 postgraduate and 55 undergraduate degrees. Students benefit from exposure to both a container ship and a Handymax bulk carrier as seafarers. It holds a Mechanical Engineering Experiment Centre with statics, dynamics, kimematics, structural tensile, multifunctional, wind, vibration, mechatronics and combined deformation laboratories. It has an Internal Combustion Engine/Metallographic laboratory plus capacity in hydraulics and pneumatics. An Institute of Marine Materials Science exists. It has academic agreements with over 70 institutions. We could form alliances that link to our maritime economy and research concentrating on its more distinctive laboratories and centres: Key Laboratory of Marine Technology and Control Engineering, Container Supply Chain Technology Engineering Research Centre, Ministry of Education; an Engineering research centre of Shipping Simulation, Ministry of Education and Shanghai Engineering Research Centre of Shipping Logistics information. Others are the Institute of Maritime Law; Shanghai International Shipping Institute; Shanghai Social Science, Innovation Research Base and Shanghai Development Strategy Research Institute and a Novelty-Searching Workstation. Examples include It also has capacity in Maritime English plus port/coastal engineering. Aware of our continent’s marketing prospects it has targeted recruitment in West and Central Africa as an emerging competitor.

**• Tianjin University of Technology, Maritime College China**

The university contains 20,067 domestic and 2423 international students with 4,578 staff. It established the School of Marine Science and Technology. This specialises in navigation, marine observation, surveying and environment areas. Although it mentions 85 postgraduate degrees and 61 undergraduates, it creates challenges to evaluate for Operation Phakisa or African maritime education; lacking sufficient accessible English or translatable information.

**• Academy of Maritime Education and Training (AMET) University India**

This academy from 1993 offers over 2500 student places. It would prove strategically diplomatic to bolster our historic connections with India, a fellow BRICS power. In 2007, the IMO formally recognised it as a maritime university. We could benefit from its networking expertise and institutional capacity with the world’s leading shipping companies –a capacity that we will need to develop for assuring global employment for our own growth in graduates. Aside from developing marine engineering; we could gain from its courses/experience in harbour, renewable energy, offshore and petroleum engineering, food processing technology, marine pharmacology, GIS and remote sensoring. It also offers Climate Studies, Shipbuilding and Repair. Postgraduate/Master’s degrees include Shipping Finance, Marine Human Resources Management, Marine Biotechnology, Marine Microbiologies, Industrial Fisheries Management, Data Science/Analytics and Fleet Operations Management. Diplomas include chartering, port agency with stevedoring and even marine catering. It offers a Polaris bridge and Neptune Engine Room simulator –among the most sophisticated global examples.

Fluid Mechanics, Engineering/Electrical/Electronic, Physics, Chemistry, Seamanship, Alternators and Motors plus Refrigeration and Air conditioning laboratories exist. Its research is globally competitive with Centres for Non-Destructive Evaluation, Marine Exploration, Maritime Information Services and Marine Science/Technology. In 2014 it listed at least 314 journal articles. It has signed many memorandums of understanding with other colleges, organisations and universities. Recent research has focused on maritime infrastructure corrosion studies, effluent treatment and coral links to algae biodiversity.

**• IRISL Maritime Training Institute, Iran**

This institute began in 1989. It unusually distinguishes between mariners and non-mariners including shore staff and those devoid of previous seafaring experience. It consists of deck, general subject, marine engineering, marine radio electronics and port/logistics faculties. The Tehran campus possesses marine satellites communication, radar, computer and medical first aid workshops. It has English language, electrical and electronic laboratories. It owns refrigeration training; ship handling and manoeuvring, Radar & ARPA, main and auxiliary machinery, ECDIS, liquid cargo handling, GMDSS, pneumatic and hydraulic simulator systems. The Boushehr campus offers a medical first aid workshop, firefighting sight, survival craft and rescue boat, personal survival techniques and an efficient Deck Hand (EDH) workshop aside from similar laboratories. It offers vocational training courses in ship security, various cargo and vessel operation types plus various officer qualifications. Others include port economics, port marketing, dangerous goods handling, equipment operator training, outsourcing, customer relationship management and dry bulk handling. Our institutions could benefit from learning and introducing its specialised courses in container terminal and yard operation, quay transfer, security, inspection, stowing and measuring performance.

**•Tokyo University of Marine Science and Technology, School of Marine Technology Japan**

In 2003 this university of 2788 students merged from Tokyo University of Fisheries (1888) and University of Mercantile Marine (1875). It has a Marine Observation Support Centre and Maritime Museum. Its postgraduate degrees that could most potentially aid African maritime education include a Master’s in safety management in a food supply chain; with PHD’s in mercantile marine extending to traffic systems and marine information engineering. Courses include marine environment, marine production, resource management and resource cultivation. It distinguishes between sea training plus faculties of marine science and marine technology. 219 international students exist -148 of whom are from China. African students include 2 South African, 1 Namibia, 1 Cameroun and 1 from Kenya. Although it offers education of internationally renowned standards; the majority of undergraduate courses are taught in Japanese, which disadvantages those from our continent. Contemporary research projects that might aid our own maritime research include polar ecosystems studies, 3D detection theory of the centre of gravity, spawning technology with surrogate mother fish and improving food health/safety.

**• Korea Maritime and Ocean University**

This university has a venerable lineage since 1919 with over 6973 current students. If our students were to attend and formal partnerships of joint cooperation were ratified, we could benefit from its background in multiple areas, Africa has yet to develop. Examples include maritime and transportation science, marine police, offshore plant operations, control automation, marine military, marine IT engineering, ocean engineering, marine space architecture, physical education, life science and oceanography. It has a Marine Biotechnology Centre and IAMU Asia LNG Training Centre.

**• Mokpo National Maritime University Korea**

This university was created in 1950 and currently offers places to 2614 students. Internationally it is far less prestigious and endowed. It has a training ship, marine engineering workshop and simulation centre, in common with other maritime colleges. It offers degrees in the following divisions: Navigation Science; International Maritime Transportation Science; Navigation Information System; Marine Engineering, Ocean Power System and Maritime Safety; Marine mechatronics; Computer Engineering; Naval Architecture & Ocean Engineering; Environmental Engineering and Biotechnology plus Ocean Civil and Plant Construction Engineering. It has at least 12 academic partnerships but none from Africa.

**• Myanmar Maritime University (Burma)**

Although this 2002 created university in Yangon offers places for over 1700 undergraduates, it does not really cater for international students. Certain social-political tensions exist globally regarding the nation although our African continent does not generally experience such problems if it were to form full academic relationships. It is limited mostly to undergraduate degrees. B. E’s in Naval Architecture, Marine Engineering; Port and Harbour Engineering, River and Coastal Engineering, Marine Electrical Systems and Electronics, Marine Mechanical and a B.Sc. in Nautical Science. These last 5-6 years –a considerable time away to invest in. Its postgraduate courses are limited to Postgraduate Diploma in Shipping Management, Port Management. No current financial support exists. It does not mention any distinctive facilities or research of interest to progress Operation Phakisa.

**• John B. Lacson Foundation Maritime University, Philippines**

This university of over 8000 students is based in Iloilo since 1948. The nation’s south is currently undergoing religious-cultural conflicts which presents a risk to Africans seeking to enrol. However, the university would be of extreme benefit to cooperate with, as the Philippines have long been known for the quality of its seafarer crew training. We could learn and gain from its formal networking with 165 global shipping companies –in providing merchant and cruise crew or introducing cabotage and our own fleets. It extends maritime education with its own maritime high school. Recent research of possible advantage to Africa includes community waste management awareness (to counter our persistent atrocious habits of illegal dumping and litter), investigating fishing practises around marine protected areas, examining maritime education’s global competitiveness through outcomes-based processes and ensuring compliance of motorboats to ISPSS and local maritime security standards. It does however require a certificate of good character, a physical and a psychological entrance exam in addition to more conventional high school standards. It offers undergraduate degrees in Marine Transportation and Marine Engineering as others do but also specialises in Customs Administration, ignored by many other global universities with the exception of South Africa. If we are to concentrate on developing marine and cruise tourism for Operation Phakisa; we could also valuably gain from its Bachelor of Science in Hotel and Restaurant Management. This majors in cruise ship service. It offers a 1 year course in seafaring stewarding or catering. A Centre for Skills Development and Training also is present with courses such as advanced metal welding.

**• Maritime Academy of Asia and the Pacific, Philippines**

This vocational college was separately established in 1998. It follows more conventional seafaring training and a competitive rival to our own institutions. Examples include its Seaman’s Training Centre and degrees in Maritime Transportation and Engineering or Integrated Maritime Studies and bridging programmes. Its research sponsors anything practical that can augment employability and skills development. Its customary facilities include Bridge TRANSAS and JRC ECDIS, Integrated Bridge System (Mock Bridge) and LNG Simulators plus a GMDSS Lab. It provides Engine Room Simulators along with Pneumatic/Hydraulics, Automation, Electromechanical System, Refrigeration and Air-conditioning and Electrotechnical Laboratories. It offers its own academy and student research journals.

**• Far Eastern State Technical Fisheries University, Russia**

Limited information –presents an incorrect link

**• G.I. Nevelskoy Maritime State University Russia**

The Internet protocol detected a virus when accessing its URL.

**• Ho Chi Minh City University of Transport Vietnam**

Limited information exists and in Vietnamese.

**• Vietnam Maritime University**

This maritime university offers a globally credible maritime reputation for its students, education and strength of partnerships. It was formed as Haiphong Maritime University in 1956. South Africa and Africa could also benefit in forming alliances with another nation of a distinguished maritime history and in providing a crew recruitment service. It has over 100 academic and industry partnerships, 15,238 students and 1004 faculty. It has attracted over $1,500 million from those connections, indicating their value. Students can choose from 37 undergraduate, 11 Master’s and 8 PHD types. These are situated in the Faculties of Navigation, Marine Engineering; Electrical - Electronic Engineering; Shipbuilding Technology; Financial Management; Maritime Business; Political Theory; Hydraulic Engineering; Information Technology and Foreign Languages. Alternatively students can enlist in the International School of Education, Mechanical Engineering Institute, Post Education Institute, Shipbuilding Science and Technology Institute, VMU Vocational College; Environmental Engineering Institute; Japan- Mekong Regional Logistics and Maritime Training Centres. It regularly publishes a Magazine of Maritime Science and Technology research. Its research has recently conceived of a general cargo vessel, propulsion plant simulator, ship equipment that can operate on vegetable oil mixtures; engine operations using dimethyl ether and intermodal transport optimisation solutions. It has probed implications of abrasive blasting materials, green supply chains, reverse logistics and fatal economic consequences of competitions and mergers after joining ASEAN.

**Americas**

• **Fisheries and Marine Institute of Memorial University of Newfoundland Canada**

Although silent on its origins; this university presents a vibrant array of multiple courses that could assist Africa’s graduates, researchers and education providers if we formed a strategic alliance. It does follow other maritime universities of similar repute in being awkwardly situated in St John, comparatively inaccessible with a limited student experience to forewarn prospective applicants, as an opportunity cost for expertise. All three Schools (of Maritime Studies, Ocean Technology and Fisheries) are directly applicable to Operation Phakisa priorities, particularly aquaculture. It does offer many online qualifications which could provide advantageous –establish correspondence courses which would minimise our need for initially expensive facilities, although ultimately virtual efforts cannot compare to immersion in actual teaching, projects and experience interaction. It offers all forms from certificates and Diploma of Technology to undergraduate to PHD. Diplomas of Technology. Examples include

Marine Engineering/Systems Design, Marine Environmental Technology, Nautical Science, Naval Architecture, Food Technology, Ocean Mapping and Remotely Operated Vehicles. Courses incorporate

Bridge Watch, Fire Rescue, Marine Diesel Mechanics, Sustainable Aquaculture, Water Quality

Fisheries Science plus Marine Spatial Planning and Management.

We could connect with assessing offshore exploration prospects and risks, oil spills, maritime safety, rescue and security. It offers multiple simulator training chances under the Centre for Maritime Simulations e.g. advanced ship handling, crew resource management, dynamic positioning, helmsman training, quartermaster management, leadership, search and rescue, propulsion plants, shipboard command and control, stability and transporting dangerous goods. Aquaculture considers Regulation and Policy; Biology and Husbandry; Hazard assessment; Quality Management; Feeds and Feeding; Harvesting, Handling; Marketing and Processing and Health and Biosecurity. The School of Fisheries incorporates Centres for Aquaculture and Seafood Development; Fisheries Ecosystem Research; Sustainable Aquatic Resources along with Community Based Education Delivery. If we are to link with Canada, we could train our maritime engineering students, technicians and faculty via the School of Ocean Technology with flume and acoustics tanks, ocean chartering, a ballast control simulator, its mock oil field, lifeboat launch and oil rig simulation. It has its own fisheries research vessel. It hosts marine bioprocessing and testing facilities. It has hosted Symposiums of Remote Sensoring and Ocean Innovation Conferences.

**• Mexican Maritime Education and Training System**

Although ratified and apparently accredited by the venerable World Maritime University; limited information exists for this IAMU member. It details the coordination of 3 maritime academies and a Master’s degree in Shipping Administration but offers minimal detail for prospective African applicants including evidence of campus facilities, global contacts, a research profile and credible existence. Deck Officers and Engineering Officers are more adequately covered by other options including extending domestic capacity.

• **California State University Maritime Academy USA**

One of the better situated American academies in Vallejo, it started in 1929. It now has 1129 students. It follows other American maritime education institutions in being restrictive and prescriptive for students, even expected to wear formal uniforms, with stringent regulations and limited campus life. Students participate in a regimented military style ‘Cadet, compulsory morning assembly, drill formation’ and leadership training program. It does offer partial compensation via a 3 week international study tour and 60 days Pacific Rim cruise for practical experience which other maritime education facilities globally would gain from. It has a variety of vessels to train. Undergraduate degrees are in Business Logistics and Administration; Engineering Technology; Global Studies and Maritime Affairs; Marine Transportation; Marine Engineering Technology and Mechanical Engineering. It does not focus on theoretical research or funding and gives limited indication of formal partnerships.

**• Massachusetts Maritime Academy USA**

Situated in the obscure town of Bourne, this academy follows a similar pattern to the other 6 US maritime education colleges with an emphasis on a regimental corps and naval service although the latter is not absolutely compulsory. It requires sea service and grants students the chance for foreign tour experience. A letter of accreditation as a US Coastguard or foreign equivalent provides a bonus. It competes with South Africa in seafaring but could assist us in preparing our own crew given its familiarity with US cabotage requirements under the Jones Act. Our undergraduates/postgraduates could learn from its specialised degrees and professionalism in maritime engineering, international maritime business, facilities management, emergency management, marine safety and environment protection. Campus facilities include aquaculture laboratories but it lacks the specialised simulators and research experimental capacity of international counterparts.

**• State University of New York, Maritime College USA**

This college has over 1900 students in its Bronx campus. Applicants need 4 years of English/social studies in high school plus 3 years’ worth of physics and chemistry, an SAT entrance exam and 2 letters of reference. It offers a Masters in International Transport Management and accreditation by the Association of Ship Brokers and Agents. Departments include Engineering, Global Business and Transportation, Humanities, Marine Transportation, Physical Education; Marine Technology Small Vessel Operations and Science. It owns tug boats, tow boats and offshore supply vessels for experience but does not mention simulators. Unusually, its Masters of Science in Naval and Maritime Studies offers courses in maritime culture/history granting South Africa a chance to develop this new area if we were to formally align ourselves to this institution/arrange an exchange or consider sending students. Courses include Music of the Sea, Ocean Politics and Law and the History of Sea Power. Students can choose between Maritime Shakespeare, Literature of the Middle Passage, Maritime Piracy and Predation, Economics of International Trade, Governmental Transportation and Environmental Policy. It hosts a number of seminars on diverse topics. The few maritime themed include hydrogen shipping, New York harbour maritime support services and financial derivatives in freight markets.

**• Texas Maritime Academy, A&M University, Galveston**

This academy follows the others between the navy or merchant marine with a regiment corps and training cruise. There is a deck mate program –qualify as Third Mate and US Coastguard or a Marine Engineering Technology Programme. It requires stringent medical and physical examinations as a condition for entry and discourages foreign students though not prohibited. However, students who qualify for entry are given the chance to gain Incentive Pay from $4000 to $32000 per semester. It offers very few courses, highly restricted and no evidence of applied research, specialised facilities or partnerships related to Operation Phakisa and our African maritime economic/education interests.

**• U.S. Merchant Marine Academy**

This academy is situated at King’s Point, New York. It gives 950 undergraduates maximum flexibility with a BSc, Coastguard and naval officer qualifications simultaneously but dissuades foreign students with a 5 year service obligation to counter its relatively cheap tuition fees. It offers good employment prospects given US cabotage requirements but the timespan does not advance our African interests or rate of return on investment. Security clearance dictates the surrendering of dual citizenship. Core curriculum requirements enable students to achieve basic skills in mathematics, science, English, Leadership and Ethics, Comparative Literature and History, Naval Science, Physical Education and Ship’s Medicine before undertaking internships and a Sea Year. They then specialise in either Marine Transportation or Logistics and Intermodal Transportation, Marine Engineering, Marine Engineering Systems, Marine Engineering and Shipyard Management. The campus does not mention any remarkable or different research output and facilities other than a Maritime Museum to the US merchant marine.

Table 27.2: International Association of Maritime Institutions Members

|  |  |
| --- | --- |
| University of Rijeka Croatia | National Maritime Training Centre (North West Kent College |
| Bluewater Yachting France | School of Marine Science and Engineering (University of Plymouth) |
| Professional Yachting Association France | Warsash Maritime Academy |
| D and B Services France | South Tyneside College |
| Jordan Academy for Maritime Studies | Lews Castle College |
| Aqaba Maritime Education and Training Centre, Jordan | Shetland School of Nautical Studies |
| Malta College for Arts, Science and Technology | Maritas |
| New Zealand Maritime School | Videotel Marine International |
| Global Maritime Education & Training Association New Zealand | The Marine Society |
| Maritime Training Institute, Pakistan | UKSA |
| CPUT Department of Maritime Studies & Survival Centre, South Africa | JPMA/Hoylake Sailing School Ltd |
| Professional Yachtmaster Training | Clyde Marine Training |
| Bahamas Maritime Authority | ECDIS Ltd |
| The University of Trinidad And Tobago | Red Ensign Ltd |
| Seagull A/S, United Kingdom | Western Maritime Training |
| Scottish Maritime Academy at North East Scotland College | Maritime Skills Academy |
| Fleetwood Nautical Campus Blackpool & The Fylde College | Stream Marine Training |
| City of Glasgow College | Ocean Training |
| Liverpool John Moores University | Ship Safe Training Group Ltd |
| Lowestoft College | Hull Trinity House Academy |
| The Institute of Marine Engineering, Science and Technology | SeaRegs Training |
| National Maritime College of Ireland | Maritime Professional Training USA |
|  | International Crew Training USA |

Other maritime education stakeholders include members of the International Association of Maritime Lecturers (IAML), the International Navigator Simulator Conference and previously cited, professional associations. Apart from members above, the IAML members include those from the British Columbia Institute of technology, the Swedish Merchant Marine Academy and SAMTRA. Unaccredited institutions include Brazil’s Centro de Instrução "Almirante Graça Aranha" (CIAGA), the International Maritime University of Panama, the Caribbean Maritime Institute, Mazatlán/Veracruz/Tampico Merchant Nautical Schools of Mexico, Escuela Nacional de Marina Mercante "Almirante Miguel Grau", Chucuito, Callao and Venezuela’s Maritime University of the Caribbean. There is a very inactive Global Maritime Education and Training Association.

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## CHAPTER 28: THE GLOBAL FUTURE OF MARITIME EDUCATION: EMERGENT MARITIME RESEARCH AREAS

A decision to invest in maritime education and the ocean economy extends beyond benefitting South Africa and Africa. Our discoveries, experiences; victories and failures can shape a more enlightened, sustainable, prosperous and enduring world. This chapter succinctly details how prioritising blue growth can contribute towards solving many of the world’s most pervasive problems, whilst simultaneously achieving our nation and continent’s own objectives. Concentrating on emergent, maritime research areas, especially those for which few comparable global facilities exist could create the maritime equivalent of an African Renaissance –if the world is prepared to listen and work with us… Equally; the reforms proposed for maritime education in this volume; could be applied to other areas; transforming a global future.

Of the core perils facing this world; climate change and the threat of extinction is the most imminent! Cyclone Pam, Hurricane Irma, Superstorm Sandy, mass Great Barrier Reef Coral Bleaching; Southern African droughts… provide too costly manifestations. South Africa is already proposing several mechanisms to assist the world with a dedicated Climate Change Research Institute. This report has already proposed mainstreaming related risk research into the maritime economy, as its most significant risk and uncertain future. The maritime sector through aquaculture, ocean renewable energy, marine eco-tourism and recreation could contribute towards the NGO/community endorsed 1000,000 Climate Jobs Now. Climateproofing ports, shipping, coastal and supply chain infrastructure could create further sustainable employment, less emissions intensive than globalisation/industrialisation alternatives. Maritime employment and research ideas endorsed as priorities in previous chapters can assist the world to favour the eco-economy. It could follow this author’s PHD thesis investing in Marine Ecological Capital as in the South Pacific to ensure resource and biodiversity security for supply chains, for trade to continue. This theory works towards climate change mitigation via less emissions intensive models. It aims to facilitate adaptation, emphasising how the maritime sector can aid South Africa and Africa to counter many climate change consequences. This enables them to implement the 2012, United Nations Framework on Climate Change and 2016 Paris Agreement. Nations can simultaneously gain carbon offsetting credits from financing schemes including the Clean Development Mechanism and other externality benefits.

Climate change also accelerates marine ecosystem and resource pressures linking to research in marine contacts, biology, aquaculture and oceanography. This contributes to reducing uncertainty over the global problem of food security. Parallel developments in maritime space observation, aquatic conservation and engineering, technology and climate change could establish greater water security! Our South African expertise at water service delivery, specialised research, storage capacity and ‘War on Leaks,” could complement our over 125 years of skilled meteorological forecasting abilities. It could investigate the associated risks of fracking and cost-effectiveness of desalinisation expanded. Access to water resources will present Africa’s most significant climate change consequence and one of the foremost of scarce global commodities. Droughts, temperatures and heatwaves are projected to multiply in frequency, duration and intensity by the Intergovernmental Panel on Climate Change. We will more effectively implement the Sendai Framework for Disaster Risk Reduction.

Aside from climate and ecological stability; developing improved naval and maritime intelligence, surveillance, and governance capacity across Africa; strengthens global security. This chapter considers developments in maritime technology, security, cybersecurity and the space economy including drones, satellites and marine contact/ecosystems can further enhance domestic and global capacity to respond. Threats from Asian poaching of ocean life to Somalian and Gulf of Guinea piracy would all benefit from increased African maritime naval, economic and research presences. One of the foremost threats to global stability is rampant migration. Climate change will amplify existing pressures and tensions over the next century. Africa’s maritime sector and stakeholders could participate in countering European pandemonium from the Middle East/North Africa or Australia from Southeast Asia via investigating solutions. Concentrating on maritime risks/hazards/failures and various future scenarios enables stakeholders to anticipate risks more effectively. Maritime, Nautical/Ocean Engineering, Ocean physics, chemistry and maritime communication developments reinforce possibilities. Analysing existing incidents and preparing a time series of disasters/other disruption risk events, additionally enhances maritime safety. SAMSA’s expertise in combination with maritime training would extend safety further. Customs, maritime law modernisation and improved supply chain capacity can simultaneously facilitate trade, whilst ensuring effective security.

Given every action has consequences and opportunity costs; South Africa’s contributions to the global future of maritime research and education can investigate other related policies. Sustainable resource usage offers a greater future to increasing numbers. Our mining history perfectly positions our nation to contribute to underwater exploration, surveying and examining the risks associated with hypothetical seabed mining. The Cook Islands in the South Pacific is contemplating its cobalt deposits but it has just formed a 1,100,000 square kilometre marine park and pledged to no species extinction by 2020. For example South Africa’s maritime sector could target how to ensure responsible, ecologically sustainable cruise, marine, submarine and eco-tourism, that integrates and empowers communities, where possible. The Cook Islands also has a devoted Ministry of Marine Resources. The aim would be to optimise the tourism experience by learning from existing models and stakeholder participation in a land orientated tourism model. We could develop a Maritime equivalent for the Green Scorpions –improving maritime law enforcement, especially among ecological crimes. We could also promote specialised units such as our elite Maritime Reaction Squadron for security –comparatively few global nations possess either, SAMSA or MLASA equivalents. We also play an active role in the International Association of Maritime Lecturers. We have specialised networks with publicly accessible information and contacts, previously listed such as SANCOR rather than the obscure offerings of others. We are credibly hosting international maritime events too such as the World Aquaculture Congress.

Maritime health, psychology and welfare can uplift non-maritime equivalents. Ocean renewable energy and maritime technology might finally help resolve our country’s monumental electricity crisis. Perhaps it could aid South Australia beyond Elon Musk’s existing contributions. As we have yet to implement cabotage; developing the optimal model, training, business operations and even a maritime parastatal may provide more immediate and verifiable evidence as to whether it represents a sound investment. Our experiments in maritime finance from various incentives to specialised banks, corporations, credit and even a stock exchange –might assist others similarly curious as to how to finance a forthcoming maritime economy, education and research sector. Our research could therefore market and examine other maritime models, policies, technology, education, scholarship, employment and investment forms to aid them.

Developments in maritime history, archaeology, culture, climate change and risk/futures could help South Africa to implement UNESCO conventions to preserve global heritage. We also have expertise in salvaging as the Costa Concordia incident off Italy demonstrated. Maritime art, cuisine and other cultural aspects, emphasise how South Africa could inspire and teach others to retain their maritime legacies. The greater ocean popular awareness and understanding is initiated, the more maritime economic, environment and employment prospects exist; the more Africa will reduce its contributions to the problems and pestilences blighting Earth’s progress. We could reverse capital and skilled labour outflows (‘the brain drain). Creating and extending maritime research areas such as oceanography, communications, submarines and surveying can minimise conflict over maritime and other resources. Our leisure and health can improve performance via developments in underwater photography, yachting and maritime sports. The development of maritime education and philosophies, employability and other skills will provide more hope and inspiration. Even ideas such as the Listening Service could be applied elsewhere… Greater maritime law enforcement and ocean governance will assist this. Eventually our maritime capacity could improve peacekeeping missions and other global joint partnerships. Given global capacity is highly concentrated in the Northern Hemisphere, enhancing sub-Saharan Africa’s capacity to observe and secure the Indian, Atlantic and Antarctic Oceans; aids those nations

Through investing in these emergent maritime research areas; South Africa through local campuses, African growth expansion, international partnerships, exchanges and competitiveness; can assist various stakeholders to achieve the following UN 17 Sustainable Development Goals (2015-2030). It can further aid the African Integrated Maritime Strategy for 2050 (Chapter 22).

**I: No Poverty**

**II: Zero Hunger**

**III: Good Health and Wellbeing**

**IV: Quality Education**

**V: Gender Equality**

**VI: Clean Water and Sanitation**

**VII: Affordable and Clean Energy**

**VIII: Decent Work and Economic Growth,**

**IX: Industry, Innovation and Infrastructure,**

**X: Reduced Inequality**

**XI: Sustainable Cities and Communities,**

**XII: Responsible Consumption and Production,**

**XIII: Climate Action.**

**XIV: Life Below Water.**

**XV: Life on Land.**

**XVI: Peace, Justice and Strong Institutions.**

**XVII: Partnerships For The Goals.**

Indirectly, the implications of the above maritime research areas could aid South Africa and other African nations to implement various African Union conventions more effectively. Examples include African Civil Aviation Commission Constitution (AFCAC), OAU Convention Governing the Specific Aspects of Refugee Problems in Africa, African Charter on Human and Peoples' Rights and African Charter on the Rights and Welfare of the Child. Others are: The African Economic Community, the African Nuclear-Weapon-Free Zone Treaty (Pelindaba Treaty); OAU Convention on the Prevention and Combating of Terrorism; African Union Convention on Preventing and Combating Corruption plus the African Charter on Human and Peoples' Rights on the Rights of Women in Africa. Maritime culture offers Charter for African Cultural Renaissance. Education, information and employment advantage the African Youth Charter, African Charter on Democracy, Elections and Governance and African Charter on Values and Principles of Public Service and Administration. Climate change, marine environment and law/security/ governance favour the Revised African Convention on the Conservation of Nature and Natural Resources.

Developing maritime education and research for the African continent and Southern Hemisphere aids others placing hope in blue economy opportunities. For example, it could offer choices for the European Union, 2020 Strategy aiming to extend beyond its current estimated contribution of nearly €500 billion and 5,400,000 jobs per year. The core strategy objectives include.***1. Develop sectors that have a high potential for sustainable jobs and growth, such as aquaculture, coastal tourism, marine biotechnology, ocean energy and seabed mining. 2:*** ***Essential components to provide knowledge, legal certainty and security in the blue economy including marine knowledge to improve access to information about the sea. It includes maritime spatial planning to ensure an efficient and sustainable management of activities at sea. It includes integrated maritime surveillance to give authorities a better picture of what is happening at sea. 3:* Sea basin strategies to ensure tailor-made measures and to foster cooperation between countries.**

These are supported by a Marine Knowledge Road Map and Integrated Maritime Policies.

Developing innovations in maritime business, trade, logistics, ports and other areas could facilitate equivalent UN, World Trade Organisation (WTO) and other policies/conventions more effectively. Local content source procurement as part of Operation Phakisa lowers global emissions and contributes towards local employment’s survival. South Africa could aid WTO members to develop experience, knowledge, policies and institutional capacity for policies in agriculture, aid, anti-dumping, customs valuation, intellectual property, trade, competition, regional trade, market access, cabotage, risks, maritime law and diplomacy. Developments in port pricing could aid equity, efficiency, trade, revenue, tourism and environment sustainability. It includes maritime finance, environment, trade related investment measures and technology transfer. Maritime innovations could be applied to other sectors, contributing to UN targets and conventions aside from the law of the sea and international maritime law, commerce and security. Economic and sustainable development, reducing poverty, the seabed, Antarctica, health, environment, culture, youth and international cooperation offer options. Producing our seafarers, officers, technocrats and researchers can answer global maritime skills and experience shortages.

Core UN/IAPH/IMO legislation ratified by South Africa includes key IMO Conventions. Concentrating on previously identified maritime research areas will improve institutional capacity to implement these policies and others.

• International Convention for the Safety of Life at Sea (SOLAS), 1974.

• International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 and Protocol of 1997 (MARPOL).

• International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) as amended, including the 1995 and 2010 Manila Amendments.

**Other conventions relating to maritime safety and security and ship/port interface**

• Convention on the International Regulations for Preventing Collisions at Sea (COLREG), 1972

• Convention on Facilitation of International Maritime Traffic (FAL), 1965.

• International Convention on Load Lines, 1966

• International Convention on Maritime Search and Rescue (SAR), 1979

• Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation (SUA), 1988, and Protocol for the Suppression of Unlawful Acts Against the Safety of Fixed Platforms located on the Continental Shelf (and the 2005 Protocols)

• International Convention for Safe Containers (CSC), 1972

• Convention on the International Maritime Satellite Organization (IMSO C), 1976

• The Torremolinos International Convention for the Safety of Fishing Vessels (SFV), 1977, superseded by the 1993 Torremolinos Protocol; Cape Town Agreement of 2012 on the Implementation of the Provisions of the 1993 Protocol

• International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel (STCW-F), 1995

• Special Trade Passenger Ships Agreement (STP), 1971 and Protocol on Space Requirements for Special Trade Passenger Ships, 1973.

**Other conventions relating to prevention of marine pollution**

• International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (INTERVENTION), 1969.

• Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (LC), 1972 (and the 1996 London Protocol).

• International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC), 1990.

• Protocol on Preparedness, Response and Co-operation to pollution Incidents by Hazardous and Noxious Substances, 2000 (OPRC-HNS Protocol)

• International Convention on the Control of Harmful Anti-fouling Systems on Ships (AFS), 2001

• International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004

• The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009

**Conventions covering liability and compensation**

• International Convention on Civil Liability for Oil Pollution Damage, 1969.

• 1992 Protocol to the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND 1992).

• Convention relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material (NUCLEAR), 1971.

• Athens Convention relating to the Carriage of Passengers and their Luggage by Sea (PAL), 1974.

• Convention on Limitation of Liability for Maritime Claims, 1976

• International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (HNS), 1996 (and its 2010 Protocol)

• International Convention on Civil Liability for Bunker Oil Pollution Damage, 2000.

• Nairobi International Convention on the Removal of Wrecks, 2007.

• International Convention on Tonnage Measurement of Ships (TONNAGE), 1969.

• International Convention on Salvage (SALVAGE), 1989.

Beyond African maritime growth chances; South Africa’s decision to embrace the ocean economy for its future; provides one of its greatest contributions to developing the global future of maritime education. Other nations can profit from our experience in mainstreaming it into government policies and coordinating all stakeholders. They can learn from our pilot projects in aquaculture, cabotage, intermodal supply chains, dry and seaport expansions and maritime manufacturing incentives. Developing seafarers from a land orientated continent if it prevails, shows it can work elsewhere. They can learn from the formation of SAIMI, multiple maritime legislation, policies and research documents; publicity and the coordination/linking of core value chain stakeholders. Focusing on stakeholder requirements ensures any potential solution or project developed is of immediate, direct benefit to demand. Sponsoring maritime education (i.e. fees free model), created devoted campuses, a careers guidance system, accessible sources and specialised events/networks/professional associations; offers further global lessons to those willing to heed experience. Even failures affirm a point of minimising opportunity costs. Other countries could appoint specialised maritime research associates, recruit globally and send students abroad specifically to learn and be of service/value. The maritime sector has been advanced as a priority at Presidential level. -An example others might consider to coordinate when embarking on a maritime route to progress. Setting maritime to national objectives as via our Marine Road Map, pilot projects and this treatise may actually help those countries and their stakeholders to achieve results. They can gain from more numerous employment prospects. Any discoveries and contributions can promote pride, patriotism and stability –economically, socially, environmentally, culturally, academically and politically. More campaigns such as ‘Proudly South African” and ensuring government support of cabotage via incentives and cargo preferences from state companies illuminates how we can preserve African maritime markets against globalisation, until internationally competitive.

Stakeholders can all benefit from increasing maritime awareness, coordination, cooperation, information sharing and opportunities. Centralising employment directories, admissions standards, courses and careers advice, existing research, funding opportunities, core stakeholders, news, events, links, risks, costs, benefits and opportunities, provides an example for others to follow. The more these are accessible, the more who will ultimately be enriched. South Africa’s active citizens, academia, industry, government and other maritime stakeholders via Operation Phakisa can initiate a more productive future for education. Being proactive means willing to not just rely on government but actually participate in the opportunities offered by the maritime sector, heeding risks, successes and failures. We move beyond being merely land orientated –to grasping our actions have maritime consequences and vice versa. It infers working towards our future and solving our problems –not just relying on the state, aid donors, corporations or others… Therefore, we can inspire others to create change –and support it, via the ideas in this report and elsewhere, with greater maritime awareness, sensitivity, training and experience. It counters growing global threats of either citizen apathy or perceived haplessness. This erodes risk aversion and inaction in an era where governments alone –even at UN level, will be able to completely solve the challenges facing our species and planet. Our populace needs to awaken and focus on the solutions not obliviously ignore the problems.

Simultaneously as Africa develops; it becomes more self-sufficient, reducing the need for aid, foreign direct investment and concern, from increasingly preoccupied, other global nations. Our nation managed self-sufficiency against a significant portion of the world. It will need similarly resilient spirits for the maritime sector as part of our future. Our consumers, public and state have held to ideals of justice and preserving rights –defending our interests in local source procurement, ensuring more flexible intellectual property for TRIPS (lifesaving drugs) and holding foreign corporations accountable –whether financial embezzlement, law breaking or political interference. We have preserved our independence economically, culturally and politically, surrendered nuclear warfare capacity and favoured truth and reconciliation over excessive warfare and vengeance. Our constitution and its guardians have fiercely championed rights and law and we have managed credible alliances across the planet from Cuba to the Middle East to Africa to Europe to BRICS’ among nations hostile/uncertain to each other. In essence, South Africa’s global maritime education, research and economy future can serve just as effectively –and be more likely to be accepted to Africa and beyond, if strategic. We need to focus on negotiation, cooperation and seeking to understand –using the maritime sector as a pinnacle for greater inclusion and moving forward. This defends the legacy of Mandela, NEPAD, the African Renaissance, AIMS and Operation Phakisa.

## CHAPTER 29: RISKS AND UNCERTAINTY: MARITIME FUTURES

Although some of us dream of the future, most do not envision mastering its course, aiming to counter risk and uncertainty. Many simply react –or prepare for intermediate stages. As for current affairs, so many of us ignore prospects and risks for the maritime sector. What do we know of the oceans? What will its future be and those who depend upon them? This chapter argues that, if Operation Phakisa and AIMS are to become more than convenient spun rhetoric to win voters and investment; its stakeholders must actively seek to master uncertainty. They need to consider all risk types, scenarios and implications as maritime futures. Every section of the maritime economy, every category of research and training, every participant needs to improve awareness and speculate over the risks that may potentially influence or be influenced by. Forewarned is forearmed! Whether it includes the implications of a melting Antarctica Ice Sheet and climate change to SA, Africa, Southern Hemisphere, globally or migration! Whether it includes geo-engineering through iron filings and phytoplankton. Whether it includes– calculating the value of coastal property that can be approximately lost and saved, ecological value of beaches; giant underwater aquaculture domed, seaweed farms and habitats or the prospects of a full war over Africa’s maritime resources, if it aids advancement or survival, it is worth considering. We could even prioritise restoring a far more pristine maritime environment –reversing aeons of plunder, befoulment and desecration. Above all else, we in Africa cannot afford inaction, maladaptation and opportunity cost.

Operation Phakisa, AIMS and this manifesto can provide the guiding vision. It can only become real if we are prepared to consider what it might take from each of us to achieve an optimal maritime destiny. Then education and the economy can be malleably moulded to this –even if it takes centuries. Prioritising ecological sustainability and climate change can ensure we have that chance. This chapter contends this reality can exist through understanding these maritime futures, learning from past success, failures and efforts. Other nations mention a ‘blue/ocean/marine’ economy and education future but do not provide concrete detail about the end they seek and how to pragmatically attain it. Nor do they mention the risks and uncertainty involved –and how to surpass them. Global maritime education reviewed in Chapter 28, is essentially static for most institutions, oblivious to the realities of the world, the changing nature of stakeholder requirements and expectations. It fails to provide concrete directions to propel future maritime research. No evidence indicates risk and uncertainty are been factored in. It does not focus on the major problems and issues including Chapter 29’s objectives. In contrast, South Africa has a credible alternative, despite present political, civic and economic turmoil.

This treatise has already identified how we can further counter uncertainty for the maritime sector through credibly channelling education, research, resources, training, ideas, funding and experience. Maritime risk and uncertainty along with climate change; needs to be effectively mainstreamed into public, private, community and individual sector decision making/policy. Regardless of what transpires elsewhere, we Africans need to reflect this.

Only by ruminating on these risks and futures, only by anticipating our competitors’ actions, inactions and reactions, can we shore minded beings, out-survive and out-prosper. South Africa and Africa’s maritime choices need to consider the consequences of every action. We cannot merely react, lurching from crisis to crisis. For example, the following factors are likely to influence risk and uncertainty regardless of any plausible scenario, including those listed in this chapter.

* **Automation/Robotics versus Human centred employment/age**
* **Climate Change**
* **Environment**
* **Economic (Demand versus Supply/Resources Available/Funding/Human Capital)**
* **Political/Social Stability**
* **Strikes**
* **Implications of Space**
* **Changing migration**
* **Increasing/Ageing Global Population/Changing Demographics**
* **Investment and business cycles**
* **Religious fundamentalism**
* **Uncertain rates of changing technology/research**

Various hypothetical scenarios may transpire, each with implications for maritime futures. The IPCC provide several for climate change as a possible template. The most probable is considered ‘business as usual scenario. This occurs where we largely continue with the current model, (with only minor changes/developments that do not make substantial progress in addressing underlying structural and systematic problems). We continue to pollute with token eco-efficiency and emissions reductions by the rich, seabourne trade and commercialisation grow normally –until we reach sudden ecological/religious/societal tipping points… underprepared and overwhelmed. Globally this has become apparent in the ‘low probability” high impact events for world financial crises to hurricanes and superstorms.

Alternative scenarios include those in which religious fundamentalism gains more power –religious cults, prophecies, Messiahs and conflicts develop; whilst secularism either retreat or fight vigorously back. It includes an age of increasing automation/robotics –where human maritime presence and control is more notional and honorary –perhaps ultimately taken over by capable AI. It could include war scenarios from BRICS’ to the Southern Hemisphere to non-Africans to fellow Africans. It includes an affluent future, after we manage to use technology, research and marine ecological investments to aid more people and Earth. Another could involve the implications of space colonisation, research and the maritime sector. It could include a Maritime Age –of culture, scholarship and exploration. It includes options of whether globalisation could get stronger, if Africa were to become more regionally integrated –or if both were to fracture even more or disintegrate. It includes possible war/hazard encounters. The implications of migrants –voluntary and involuntary, provides more conditions. From submarine cruise tourism to species communication, anything that may reduce uncertainty and provides benefits of minimal externality costs.

From evaluating seabed mining to introducing cabotage, cruising, marine aquaculture and reserves… From collapsing ecosystems, tsunamis and earthquakes to the construction of giant hovering observatories, automated sensoring, field research stations and artificial floating cities, it is worth considering risks, uncertainty and potential futures. Scenarios could consider if mega projects in port expansions or crew and simulator training in a world of increasing automation will ever be financially viable. How can cybersecurity be enforced against violations –more guaranteed? How would a resurgence of piracy affect nations beyond Somalia and the Gulf of Guinea? Would desalinisation plants help counter our water shortages along with improving existing efficiency/capacity? For a maritime future the choice could range between increasing isolation –Africa/South Africa first, especially given our education and economy initial efforts. Or we could elect to play more active maritime roles. As Australia and Europe flounder over immigrants and a splintering European Union, the Middle East face political and religious fundamentalism; China dominates economically and North Korea/the US President concern many areas, we in Africa must factor in these risks for our land and our oceans.

Will technological progress or prosperity emerge? Can it be sustained? An alternative African future –considers more prosperous conditions, where we advance far more rapidly, without the world’s distractions, targeting the marine knowledge economy and environment first. We have the capacity to promote localisation –controlling our own maritime education, economy, shipping, stock exchange, financial sector, environment, series of navies, core coasts, infrastructure, policies and stakeholders. Increasing awareness, coordination, communication, information and cooperation will further promote the needed political, social, economic and environmental stability. One possibility is a marine technological future. Alternatively we could follow maritime and planet worship as the crux of our newfound appreciation of our ocean sector.

Conversely, everything already accomplished, everything worked towards can ultimately and swiftly fail; if we do not factor in risks and uncertainty. If we ignore existing constraints, challenges and opportunities, no existing maritime sacrifice, investment or policy will be sufficient. We can do this by not just channelling resources to where they will have the best impact but also by concentrating on those who have so much to contribute. South Africa or Africa could soon implode. Globally, so much human, natural, financial, technological and educational capital is squandered frivolously. So many things could be pre-empted or costs decimated. Could we avoid a conflict between humanity and AI? Other species could take over –launching retribution and revenge. Other nations could be ransomed by piracy, collapse over water, land and other resource rights. Oil rigs could explode. Undersea cables burst. Satellites crash. Automated shipping, changing species migrations and large iceberg chunks transported could wreak pandemonium with navigation, beachfront properties and coastal ecosystems.

Africa could be utterly ignored and left to defend for itself. Other nations may become even more preoccupied with the above mentioned risk factors, problems and scenarios. Climate change, migration, collapsing ecosystems, economic fluctuations, demographic and savings shortage crises, outsourcing to Asia, European fragmentation, apathetic populace, religious and political extremism, short sighted political policies and absences of credible leadership globally may prove more pressing –permanently with little progress. Students or the poor could revolt against hopelessness, exclusion and marginalisation. The affluent could retreat –to Arcadian citadels, space Utopias or private sanctuaries. The experienced, qualified technocrats and intelligentsia, underappreciated or supported could emigrate in waves. The maritime sector may be even more vital –other nations needing South African guidance. Or we could be called for greater roles to play globally –for once in our history be actually appreciated, valued and praised. The IPCC mention several apocalyptic environmental futures. These affect the maritime sector –from collapsing ecosystems to the loss of entire islands and maritime supply chains from the Maldives, Kiribati and Tuvalu. Sea level rise, storms and other hazards create immense cost consequences to risk and uncertainty management. In response, we could climateproof supply chains and develop eco-economies, create new maritime refuges, sanctuaries, satellites and corporations. Or we could pray for a miracle –Gaia or the outside world will somehow elect to save us…

Alternatively states could invest so much in the maritime sector, only to be undermined by any unexamined risk –or even an unresponsive populace/stakeholder indifference. Or foreigners could employ our citizens as proxies to exploit benefits. If any of us flourish –we may face international pressures including hostile corporate takeovers or dumping. Limited growth prospects means the future could stagnate or have only modest success. Therefore, the momentum needs to be sustained or ultimately doomed. Continuous zealous dedication to future risks, possibilities and trends, preserves this impetus. Projects can move to commercialisation and the next phases. Thinking of the solution rather than the problem, avoids more mistakes. Having besmirched the shores and hinterland –we cannot afford to sacrifice the ocean sector, as individuals or as a species. This is why risk and uncertainty need to be factored in. Maritime Risks and Uncertainty will provide Africa’s maritime education and destiny to truly persist. The one advantage of being behind –is catch up or convergence growth –We can target what most matters, what functions efficaciously and what we can afford. We can filter out irrelevance and empower those of our society who deserve it. We can harness students and society, recruit globally, create multiple exchanges and partnerships but increase awareness, coordinate and support potential.

Although not uncertainty can be countered or resolved, it provides us with more chances and hope. We gain more time to react and more resources. We can become more future rather than present moment situated. If our maritime choices do not meet with success, it can condense the extent of inexperience, loss or failure. AIMS, Operation Phakisa and a clear mandate for maritime risk and uncertainty can provide our citizens with hope, a set of purposes and to recognise chances or opportunities. We need to learn from the world to avoid the perilous risk of ignorance in areas we cannot independently replicate. The more we can experiment, invest, dedicate, determine, speculate, illuminate and attempt, the higher the probability of these aims. It may not save us –but it might just offer the only way out. Part of this, needs to consider the spill-over effects of our choices. One primordial risk that remains is to wonder how will Africa regionally or the external world react? It is all very well to target 1000,000 maritime economy jobs by 2033 but why? How? What happens after and what are the implications beyond? Can we be sophisticated enough to recognise the unknown, factoring serendipity and failure? Any of the above risks and scenarios portrayed could unravel every achievement, how would we react to recover?

What do we take for granted? What conditions will change that? What are our strengths and limits? Is the path of globalisation, economic liberalism, secularism and a uniform technocratic global future; the optimal path for all on board –or seeking to be? It is not enough merely to consider it as a conventional SWOT analysis for policy planning but for all stakeholders, research sectors and projects. Our stakeholders need to be trained for future risk evaluation, engaged in formal and impromptu debates/conditions. We need to conscientiously evaluate what factors contribute and which hinder our maritime future. Maritime awareness includes eliminating the unknown –computing low probability, high impact events –this may even be profitable. Other risks may emerge –but at least working for those envisioned, will provide experience and less exposure. If we are to achieve prosperous scenarios –even space colonisation. –If we are to endure –we need to prevail past the next few decades determining the fate of our species and most others…

## CHAPTER 30: CONSTRAINTS, CHALLENGES AND OPPORTUNITIES

How can we train people to consider a future in the maritime sector? How can they believe in and value it? How can they be motivated to develop the maritime economy; restore its ecosystem and resources? What problems remain? There remains an opportunity cost to every decision or lack of one. This chapter briefly outlines in Table 30.1, the core constraints to developing Operation Phakisa in reality our stakeholders must overcome. It identifies challenges to be vanquished and opportunities to be seized.

Table 30.1 Constraints To Developing African Maritime Education and Economies

|  |  |
| --- | --- |
| * **Land/Geophysical** | * **Environmental** |
| * **Information** | * **Political** |
| * **Communication** | * **Administrative** |
| * **Labour** | * **Technical/Technological** |
| * **Capital** | * **Lack of Coordination** |
| * **Financial/Funding** | * **Lack of Cooperation** |
| * **Commercial: Profits** | * **Education/Training** |
| * + **Fixed costs** | * **Planning/zoning** |
| * + **Variable costs** | * **Transport** |
| * **Demand/Supply** | * **Uncertainty of Climate Change** |
| * **Enforcement Capacity, Legal and Policy** | * **Other** |

**Challenges:**

**Psychological Factors Clarifying Stakeholder Reluctance to Prioritise Operation Phakisa and Maritime Education**

* Access to capital/finance –or awareness of options.
* Asymmetrical information/climate change uncertainty.
* Lack of concern.
* Lack of incentive/legal uncertainty.
* No investment/information criteria.
* Originality –Novelty –resilience to chance and change.
* Other priorities –finance, risks, business operations.
* Perceived relevance.
* Risk ambiguity.
* Scepticism.
* Timing.
* Uncertain short run profitability and benefits.
* Uncertainty over cost effective, sustainable adaptation responses.
* Unknown inaction, maladaptation and opportunity costs.

**Information Specifically Required for Stakeholders to Invest and Adapt**

* Asset resilience under Maritime Futures Risks and Scenarios.
* Conditional Probability of Failure, Timing, Intensity.
* Coordinated, centralised information over demand, supply of skills, research progress, projects, qualifications, jobs and other opportunities
* Extent of Vulnerability/Risk.
* Event experience.
* Impact Costs.
* Implications for cashflow, gearing ratio, liquidity, solvency, profit, Return on Investment. P/E to growth ratio, P/cashflow, P/E ratio, Profit Margin.
* Portfolio Exposure.
* Projected Recovery Time.
* Projected Performance.
* Opportunity/Inaction Costs.
* Regulations, Taxes, Incentives and Penalties.
* Stakeholder requirements
* Targeted benefits, cost savings, revenue and opportunities.

**Physical Indicators Measuring the Extent to Which an Investment is Effective.**

* Business Awareness Changes.
* Change in Asset Performance.
* Change in Conditional Probability of Asset Failure/Asset Resilience.
* Change in communication, financial, information, physical, psychological exposure and leadership.
* Change in Percentage of Assets Exposed.
* Change in Risk Perception/People trained.
* Competitors.
* Coordination/Cooperation with other stakeholders.
* Demand/Supply/Market Changes.
* Development of a Business Continuity Plan.
* Extent of Mitigation/Adaptation Investment.
* Extent of localisation versus Globalisation, Asset Interdependency and Supply Chain Exposure – (willingness to support maritime opportunities, products, services and employment).
* Future Earning Power.
* Liability/ Projected Risk/Vulnerability –Long Run/Short Run.
* Recovery time changes.
* Resources Allocated/Reserves.
* Resource Sustainability.
* Stakeholder Reactions/Reputation/ Requirements.

Other challenges to establishing Operation Phakisa include the potential uncertainty of stakeholder reaction –domestic and foreign. These depend on the extent to which stakeholder requirements can be continuously adequately sustained and quality of education maintained. Additionally, Any African maritime company/education would experience the risk of significant, potential foreign competition and experience. Foreign competitors could always swiftly retaliate as we change direction. The Maritime Knowledge Road Map has already identified scarce valuable skills. Political –economic instability, reputation costs and racial-cultural-other factionalism schisms in Africa’s higher education sector including student riots may discourage those we need the most, –who simply wish to get on with advancing our continent. Other potential risks include a lack of dedicated research and information –even a lack of accurate information, business plans and case studies upon which African academics, companies and policy stakeholder can learn from to mitigate potential uncertainty. South Africa/Africa’s infrastructure, stakeholders, education capacity, funding sources and policies are obsolete. Or they are not currently designed to favour or prioritise the development of most recommendations and maritime research ideas in this report.

Significant risks exist for the finance this need. Existing firms are likely to be biased in favour of Grindrod and Safmarine or foreign companies, rather than local, inexperienced operations. We need to counter private sector reticence. Downgraded credit ratings and our reputation of three overpowered global agencies ignores our banking sector soundness. It detracts from enticing foreign direct investment. This further challenges new entrants in education and for the marine economy. Currently it is unknown as to whether stakeholders themselves are interested in this primarily government initiated proposal –yet their consultation and involvement is pivotal if it is to be efficacious. Whilst global seaborne trade has outgrown GDP growth; on average 4-5% since 1990; another potential financial crisis could occur. What can South Africa or any African nation do to distinguish itself from other international competitors seeking the same. Other uncertain risks specific to Africa include the unknown implications of port modernisation projects including Durban’s $7.5 billion, second proposed port. Will sufficient volumes of coastal trade justify the significant resources devoted to establishing, coordinating, retaining and enforcing a maritime education policy? This report therefore identifies that perhaps the most significant challenge is reputational: Given Africa’s past and its developmental challenges; it is expected to fail… supply chain stakeholders, academics, governments and investors internationally are highly likely to remain sceptical towards our own attempts at asserting maritime economic, educational, political, legal, environmental, safety and military sovereignty, aside from seeking to protect their own historic interests. If there is any chance, our continent/nation will need to consider whether any potential risks can be managed and resolved, primarily targeting our own continent through the following section opportunities not relying on outside.

This report has chartered myriad opportunities from those existing to African and global growth prospects to future directions and scenarios for Operation Phakisa. Those identified for maritime education and a marine economy include options from underwater mining and floating habitat cities, ecologically sustainable vessels and synthetic marine based fuels –SASOL/ MOSSGAS. It could include maritime security and technology applications for submarines, desalinisation and ocean renewable energy. The greatest opportunities arise from those first willing to act on the recommendations summarised in this report. Given the potential value, its contribution, its significance and our African vision for its future, we understand so comparatively little. We underappreciate even more. Project Nemo: would invoke underwater cartography to charter the oceans. Operation Arion would be the first to establish regular maritime interspecies cooperation, contact and understanding. We could establish Transfrontier Marine Parks defended by voluntary armadas, hovering observatories, drones and our own operated constellation of satellites. As we embark on a maritime path, it becomes more imperative to consider true ocean health status, especially for our neighbouring Indian, Atlantic and Polar Oceans.

This involves accurately determining its ecosystem, environment and climate condition –then the impact of climate change/risks. Only then can we determine a sustainable ocean economic potential. We should focus on marine biodiversity databases, experiment on marine value adding/medicinal properties, establish marine plant and fauna sanctuaries and consider tides, currents, oceans, maritime geography. We could aim for a more responsible role in research, education and community development. We could identify maritime heritage asset registers and climateproof supply chains. If our planet needs to restore its ocean health, we could aid rather than callously suppress it, as at present. We could favour an Ecological Capital theory of maritime resource, risk management –preserve and restore ecosystems. This extends to-coral restoration and species biodiversity rehabilitation projects. Separate authored reports identify cabotage, eco-cruise tourism, aquaculture, space economy and other opportunities, highlighting maritime scholarship and African supply chains as the prime initial steps.

To change willingly stakeholders will need to be convinced, how can it personally aid them and their strategic objectives? This includes the core challenge of bureaucracy. Operation Phakisa will need to resolve water scarcity and supply electrical stability. It will have to work with others ensure community cooperation, counter crime and our weak Internet signal capability. Local municipalities employ considerable autonomy to blockade economic development. Our planning zones are ossified under apartheid era, anti-entrepreneurism and segregated. Its outdated policies are echoed in unreformed universities currently teaching it. Requirements for multiple EIA’s and other assessments cause expensive delays and enrichment opportunities for consultants. Many citizens lack land tenure security and enforceable property rights after 23 years, lacking credit access. Under the Public Finance Management Act –municipal procurement is centralised whilst qualified technocrats such as doctors, engineers and accountants lack both autonomy/discretion over funding and equal accountability to political ‘managers’. Citizens will need to be trained to be entrepreneurs, innovators and company creators –not just employees. Financial/Business and marine eco-literacy or ocean popular understanding are essential along with investing in core skills. To reward this effort, myriad maritime opportunities exist as this report states. Examples range from the above to marine recreation, to businesses related to new port expansions, consultancies, maritime education, financial credit and insurance to technology and security. Our existing fishing fleet is also rapidly aging. The task of future maritime education will be directed to evaluating each citizen and helping them to achieve their potential.

## CONCLUSIONS AND RECOMMENDATIONS

How can African maritime sovereignty be defended? Few nations than border three Oceans (Indian, Atlantic and Antarctic with such a long coastline that remain so ignorant, underconserved and underutilised of potential… Yet this report aims to demonstrate what has been accomplished and the miraculous gifts that a well-structured, maritime vision can provide, if properly sustained, supported and motivated. Awareness and education can evolve this, inspiring fellow Africans and the world to make this Africa’s century –a new maritime extension to the African Renaissance. Investing in Africa, preserving the future of its oceans, considering risks can work towards the optimal future, more than simply raping it, ignoring it or marginalising it. This African originated initiative can be exported globally to greater success for maritime potential…One core challenge will be to centralise this to attain multiple objectives with scarce core personnel and resources. In conclusion this researcher offers to help direct this vision of establishing Operation Phakisa through maritime research, education and the economy from dreams into reality. Through SAIMI and our existing institutions, if supported, they can inspire others.

Therefore, this research recommends the following:

* **More citizens need to be empowered and encouraged to be proactive –via awareness, education, the Listening Service and greater coordination/cooperation. Efforts need to be continuously updated and supported, for people to remain motivated.**
* **If maritime research, education and an economy is to be considered successfully as a proposition, this report advocates key stakeholders should share prime information relating to their work. A National Committee to coordinate effort should be prioritised.**
* **Stakeholder consultation and coordination into the advantages, disadvantages, risks and opportunities of would minimise uncertainty for all potential stakeholders to know whether or not to support an African maritime economy and future.**
* **Value chain stakeholders are advised to consider increasing community, media, business, education and other forms of social and broadcasting media to encourage popular awareness given a historic lack of demand and unfamiliarity with the Africa sector outside, beyond South African borders and across the continent.**
* **If maritime education is to be prioritised, this report advances inserting it not only into part of Operation Phakisa but into municipal, provincial, national, regional and private sector/community-based efforts by maritime stakeholders.**

* **More research is conducted on the implications of an African/South African maritime education. This could establish particular demand and supply prospects.**
* **Additional research to compare foreign maritime education and training facilities for host ports, value chains and stakeholders, as well as to consider if other African/global can be considered rivals or promoters of opportunity**
* **Research is also necessary to establish business plans and ascertain if both foreign and local owned additional supply is equivalent to demand. It must identify charter/construction/operating costs, potential profits, costs and risks.**
* **Identify existing constraints to establishing an African maritime sector and other opportunities.**
* **Repealing/changing legislation to enable stakeholders to participate. Provide financial incentives and deterrents.**
* **Maritime education needs linking to stakeholder requirements to provide incentives. It needs to establish an African operated/chartered/constructed coordinating centre and specialised research institute**
* **It endorses establishing funding sources to promote local maritime companies and provide loans to emergent value chain stakeholders including seed capital and education**
* **This source proposes encouraging BEE partners to link with academics and government for mutual public-private partnership and funding investments.**
* **Value adding and beneficiation/ value chain opportunities could be developed including more local products/souvenirs.**
* **Promote reserves –maritime resource security, biodiversity, rare species conservation**

To enable the maritime sector to thrive further the risks above could be managed more effectively and the opportunities were exploited. Until this treatise there have been few visions concerning the national, regional or global future of maritime education and research. Existing maritime universities remain separated from economic realities and many global problems. They are seldom integrated into business, government, communities and other stakeholders –where South Africa can lead Africa and the world. It can learn from MLASA, other professional associations, our specialised Ethekwini Maritime Cluster, industry connections and other partnerships. This vision for an African maritime era of scholarship and the economy, aims to outcompete and out-prioritise others similarly seeking to harness the Oceans. It aims to surpass the limits of existing institutions, nations, stakeholders and individuals; ignoring the future of oceans and the maritime sector. Rather than plundering unsustainably as with the land; future generations of Africans must prove to humanity; our species can resurrect the ocean and ecosystem. By discovering a maritime destiny; we can future proof against risk and uncertainty.

The ideas proposed in previous chapters emphasise how we can move towards real issues. For example South Africa could focus on not only developing marine hybrid and purer fuels –based on SASOL and MOSGAS synthetic previous experiences –moving the world beyond oil. This would reduce not just emissions but the autocracy and instability associated with petro-dollars and ‘Dutch disease.’ This applies from Angola to the Middle East to Venezuela. Marine pollution –especially the giant pools of accumulating plastic present global hazards not just to maritime ecosystems but to vessels, navigation aids, sensor probes, recreation, health, port and offshore structures. We could investigate creating African Maritime Emissions Control Areas and improved maritime data/traffic management. Each step is one towards asserting our individual nation, regional and continental sovereignty, via the maritime sector. It shows how it can be financed and made possible.

Maritime education needs to focus on risk management and opportunity. It must emphasise how we can enhance resilience, improve employability and life skills. Education needs to not just focus on mere simulators but immerse in real risks, vessels and experiences. It needs to consider entrepreneurship and technology implications. For example, this report advised investigated implications of increasing automation on crews and pressures upon existing seafarers as a maritime health/psychology priority. The consequences of maritime robotics offers another. Continuous professional development represents a growing demand aspect for maritime education. In a rapidly changing world, to minimise collateral damage of ‘Future Shock’, education –and people are becoming less static –continuously needing skills, courses and experiences to adapt to thrive. Or even merely keep up and survive. Greater flexibility/part time degrees, more customised research, courses and skills development, to stakeholder concerns is something that South Africa’s model can reinforce for existing and future maritime institutions. Education may need to start earlier –from installing ocean popular awareness and understanding as a core course to our development of three initial maritime high schools. Whether introducing new subjects and research areas to updating equipment and technology transfer to community engagement, student welfare and investigating the feasibility of fees free, university education; South Africa presents not just contributions for maritime but for an more aureal epoch of general global education. All we and others need to do, is to follow these recommendations, believe and support in an African maritime destiny to transform Operation Phakisa from dreams into reality…

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