

African Ocean Governance Strategic Blueprint

Draft pending PoE review



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I. Introduction

Ocean Governance and the Blue Economy

The collective Exclusive Economic Zones of African Union Member States comprise some 13 million km², while the total length of the continent's coastline – including African island states – is over 48,000 km (Brenthurst Foundation, 2010). However, whilst African countries participated actively in the negotiations leading up to the adoption of the 1982 United Nations Convention on the Law of the Sea (UNCLOS), the economic potential of the African Maritime Domain is for the most part either underdeveloped, or is being exploited – legally and illegally – by companies from other parts of the world, with huge losses in revenue to African countries.

The coastal population of Africa is relatively small in comparison to the global average, with about 18% of Africa's population living within 60km of the coast¹. About 52 million of an estimated 204 million people live along or near the coast in West Africa where there are some of the highest coastal population densities on the continent. The areas in and around Nigeria, for example, have an estimated coastal population density of about 250-500 people per square kilometre. On the East African coast, an estimated 34 million people live at or near the coast, and urban coastal populations are growing by 5-10% in some coastal cities, enough to double within 7-14 years (Hinrichsen, 1998).

In 1950, Alexandria and Cairo were the only African cities exceeding 1 million inhabitants. In 2005, there were 43, with an average size of 2.5 million and a combined population of more than 110 million. It is projected that in 2015, there will be 59, with an average size of 3.1 million and a combined total exceeding 168 million. By 2025, there will be three megacities (populations in excess of 10 million) (UN-HABITAT, 2010 & 2014).

In this context, there has been growing recognition of the need to optimize use of the potential offered by the African Maritime Domain and its resources while at the same time protecting the resources which are the basis of what has, in recent years, become known as the "Blue Economy".

The AIM Strategy

On January 31, 2014, the AU Assembly of Heads of State and Government adopted the 2050 Africa Integrated Maritime (AIM) Strategy. The vision of this strategy is: "... to foster increased wealth creation from Africa's oceans and seas by developing a sustainable thriving blue economy in a secure and environmentally sustainable manner" (para. 18).

¹ Based on statistics by Hatzioles et al 1996, in which it is estimated that the population of Africa's coastal states is about 75% of the African population; and about 25% of the population of these coastal states live within 60km of the coast.

The strategy suggests that this should be achieved through “.collaborative, concerted, co-operative, coordinated, coherent and trust-building multilayered efforts to build blocks of maritime sector activities in concert with improving elements of maritime governance” (para. 19).

The Blue Economy

The original concept of the Blue Economy was elucidated in a book of the same name published in 2010 by Gunter Pauli. It is essentially a further development of the Green Economy which espouses a business model based on a number of innovative, nature-based technologies aimed at shifting society from scarcity to abundance by tackling issues that cause environmental and related problems in new ways. The use of the adjective “blue” rather than green is linked to the fact that the sky and oceans of our planet are blue.

More recently the term has commonly been used to refer to the ocean-related components of the Green Economy which, in turn, has been variously defined. UNEP (2010), for example stated: “A green economy is one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.” In this vein, paragraph 8 of the AIM strategy states: “There is also the urgent imperative to develop a sustainable “blue economy” initiative which would be a marine version of the green economy, one that improves African citizens well-being while significantly reducing marine environmental risks as well as ecological and biodiversity deficiencies.”

The AIM strategy lists the following activities as having potential to contribute to the development of an African Blue Economy:

- Maritime commerce and intra-Africa trade;
- Shipbuilding and ship repair industries;
- Maritime transport and infrastructure including linkages to land-side transport systems;
- Ports and harbours management;
- Maritime safety and other auxiliary services (navigational aids, meteorological services, search and rescue etc);
- Maritime defense and security;
- Ships’ manning services and supply of seafarers;
- African vessel ownership and registration;
- Maritime tourism;
- Fisheries and aquaculture;
- Offshore exploration and exploitation.

Ocean Governance

While the AIM Strategy does not define governance, it recognises the need to build capacity for maritime governance and outlines a number of governance challenges. Governance has been defined in different ways elsewhere, including :

- A process of informed decision making that enables trade-offs between competing users of a given resource so as to balance protection with beneficial use in such a way as to mitigate conflict, enhance equity, ensure sustainability and hold officials accountable (Turton *et al.*, 2007 : quoted in UNEP/NC Secretariat, 2009).
- Governance entails the institutional capacity of public organizations to furnish public and other goods and services to the citizens in an effective, transparent, impartial and accountable manner (subject to resource constraints), thus intertwining both political and economic governance. As such, governance provides an enabling environment for development and eradication of poverty and deprivation, and has qualities such as protection of property rights, equitable development and accountability (UNDP, 2003).

Governance challenges in the maritime sector in Africa include:

- The delimitation of maritime boundaries which has consequence in relation to ownership of resources
- Maritime security and safety – particularly piracy
- Unsustainable use of living marine resources which is exacerbated by illegal, unregulated and unreported fishing activities
- Unsustainable use of non-living marine resources
- Prevention and management of threats to coastal and marine ecosystems including:
 - Marine pollution
 - Invasive alien species
 - Physical alteration and destruction of habitats as a consequence of inappropriate coastal development
 - Rapid and unplanned development of mega-cities
 - Lack of planning and regulation of the use of ocean space (for example for submarine cables, ocean energy generation etc)
- Responding and adapting to the anticipated impacts of climate change
 - Frequency and intensity of extreme weather events
 - ocean acidification and warming
 - coral bleaching
 - sea level rise, coastal flooding and erosion
 - Changes in circulation and salinity
- User conflicts as a result of a lack of spatial planning.

A cross-cutting factor of these challenges is the lack of capacity either in terms of human or financial resources, or, in most cases, both.

Integrated Maritime Human Resources Strategy for Africa

The AIM Strategy notes the need for skills in various sectors including shipping and logistics, offshore activities, fishing, tourism and recreation, and safety and security. It also points to the need to take gender balance into account in developing the HRD Strategy, which is expected to focus on:

- the "nature of Africa's maritime industry including human resource requirements";
- the "principal sources for competitive advantage";
- the "nature of deliberate investment required in the education and training of the maritime workforce", including in maritime administration and marine safety;
- strategies to expand the workforce in the maritime sector;
- the "conduciveness of work conditions to attract new comers into the maritime sector";
- the "competitiveness of Africa's skilled manpower in the maritime sector";
- an improved relationship between the maritime industry, institutions of higher education and training as well as research institutions;
- mechanisms for the recognition of prior learning; and
- "support programmes for research in maritime education";
- the development of capacity for "data gathering and statistical information for improved policy making" (AIM par 54).

Agenda 2063

2063 is "A global strategy to optimize use of Africa's resources for the benefits of all Africans" which is expected to be adopted in January 2015. It is both a Vision and an Action Plan. It is a call for action to all segments of African society to work together to build a prosperous and united Africa based on shared values and a common destiny.

The document setting out Agenda 2063 – The Africa We Want – lists the following general aspirations:

1. A prosperous Africa based on inclusive growth and sustainable development
2. An integrated continent, politically united and based on the ideals of Pan Africanism and the vision of Africa's Renaissance
3. An Africa of good governance, democracy, respect for human rights, justice and the rule of law
4. A peaceful and secure Africa
5. An Africa with a strong cultural identity, common heritage, values and ethics
6. An Africa where development is people-driven, unleashing the potential of its women and youth
7. Africa as a strong, united and influential global player and partner.

Each of these incorporates more specific goals and targets. For example, Aspiration 1 states: “ Africa's Blue economy, which is three times the size of its landmass, shall be a major contributor to continental transformation and growth, advancing knowledge on marine and aquatic biotechnology, the

growth of an Africa-wide shipping industry, the development of sea, river and lake transport and fishing; and exploitation and beneficiation of deep sea mineral and other resources.”

Agenda 2063 thus lends further support to the implementation of the 2050 AIM Strategy.

II. Governance Challenges

Maritime security and safety

The successful development of a thriving maritime economy requires maritime transportation systems that are secure from criminal activity at sea. Criminal activity at sea include, money laundering, illegal arms and drug traffic, piracy and armed robbery at sea, illegal oil bunkering/crude oil theft along African coasts, maritime terrorism, human trafficking, human smuggling and asylum seekers travelling by sea.²

The safety of merchant ships is also paramount to growth and environmental protection. Without applying best practices to ship construction, life saving appliances and arrangements, radio communications, safety of navigation, carriage of cargoes and dangerous goods and training of seafarers,

International trade relies heavily on maritime transport, with 90 per cent of cargoes and commodities carried by sea, making this sector essential to the global and regional economy. When security and safety issues jeopardize maritime transport it has a far-reaching knock-on effect on *inter alia* transport of trade, global food security, economic security, energy security and trade and manufacturing industries.

All the services derived from the ocean are therefore related to security, including protecting marine biodiversity, which ensures both food and health security.³ Yet it is not only the benefits derived from the ocean that we need to secure but also the ocean in itself is a source of insecurity and lives, livelihood, property, ports and coasts need to be protected from extreme weather events such as storm surges and tsunamis. Maritime safety and security therefore includes both political security as well as social, economic and environmental security.

The current context of maritime security is one where if the United Nations Convention on Law of the Sea (UNCLOS)⁴ was fully implementable it would have provided the necessary security solutions, but it does not provide said solutions and issues such as climate change, the financial crisis and security are

² 2050 Africa’s Integrated Maritime Strategy, AU, Version 1.0,2012 p11

³ Marine genetic resources are the basis of all our pharmaceuticals.

⁴ United Nations Convention on the Law of the Sea, 10 December 1982. Entered into force 16 November 1994.

three interdependent factors that increase vulnerability. Sea – level rise serves as a prominent example of a climate change impact that threatens security; the distribution of oil supply relies on sea born trade, ports threatened by sea – level risk being inundated, impacting the distribution of oil supply, ultimately posing a risk to human security.

Ensuring security in the context of both conservation of resources as well as protection from extreme weather events requires adaptation and mitigation measures, which in return requires funding. There is an urgent need for the transfer of funding and technology but the means and the tools to facilitate such transfer and cooperation amongst states is not forthcoming and cooperation amongst states is desperately needed.

[Criteria for achieving enhanced maritime safety and security/ Vision](#)

Legal framework:

- The lacuna around financial and technological transfer that exists is addressed
- Flag states take full control over vessels
- The role of Flag States are strengthened and complimented with the role of the Port State
- The principle of common but differentiated responsibilities are recognized
- UNCLOS is further complemented in the same manner as with the Straddling Agreement to further ensure ocean governance and benefit sharing in protecting common heritage
- Cooperation amongst States are facilitated
- All coastal states in Africa are party to or implements the relevant international and regional programmes of Member States, including but not limited to:
 - The International Ship and Port Facility Security Code (ISPS code) – ensure that it is implemented and enforced by all African states, on board all ships as well as in all ports engaged in international maritime transport
 - Djibouti code of conduct – Western Indian Ocean and Gulf of Aden, signed by all
 - A similar code of conduct is in place for the East coast of Africa

Socio - economic conditions:

- There is a clear understanding that underlying social, economic and political conditions in Africa needs to be addressed and this is taken into account in all action plans
- Resilience of coastal communities are strengthened

Capacity development:

- Under the 2050 AIM strategy, support and technical assistance are provided to African states, to ensure effective coastal and maritime patrols and special attention is given to the development of effective Navies/ Coast Guards.⁵
- Vessel Traffic Services (VTS) are in place
- The 2050 AIM strategy's strategic action is implemented and supported in that "awareness –raising, through media and training workshops, and capacity building in source and transit countries" are undertaken.

Current Status of Legal and Institutional arrangements

The following International Conventions are relevant to Maritime Safety and Security:

- Safety of Life at Sea Convention (SOLAS) Chapter XI amended to include special measures for maritime security, chapter XI has been divided into 2 parts: Chapter XI - 1: Special Measures to Enhance Maritime Safety; Chapter XI – 2: Special Measures to Enhance Maritime Security (incorporates new regulations regarding definitions and the requirements for ships and port facilities. These regulations are supported by the International Ship and Port Facility Security Code (ISPS Code) – mandatory section (Section A) and recommendatory section (section B) (Note: SA incorporates the ISPS code by its Feb 2004 Merchant Shipping (Maritime Security) Regulations
- Convention on Standards of Training, Certification and "Watchkeeping for Seafarers

⁵ Ibid at p 25.

- Load Lines Convention
- Collision Regulations
- Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation (SUA)
- Djibouti code of conduct
- Memorandum of Understanding, following Paris MOU:
 - Indian Ocean MOU
 - Caribbean MOU
 - Abuja MOU

The following working groups and initiatives are also in place to further address Piracy and Armed Robbery at Sea:

- Work of the Contact Group on Piracy Off the Coast of Somalia (CGPCS)
- IMO initiatives to combat piracy and armed robbery against ships, including the Best Management Practices (BMPs) for vessel protection in High Risk Areas (HRA)
- The following working groups and initiatives are also in place to further address maritime terrorism:
 - Set out in the 2050 AIM strategy, the AU, the RECs/RMs, and member states will “strive to support the African Centre for the Study and Research on Terrorism (ACSRT) in the operationalization of the Terrorism Early Warning System as well as all ACSRT activities listed in its strategic plan
- The following working groups and initiatives are also in place to further address Human Trafficking, Human Smuggling and Asylum Seekers Travelling by Sea:

- UN Convention against Transnational Organized Crime, and Protocol to Prevent, Suppress and Punish Trafficking in Persons, Especially Women and Children
- The United Nations Global Initiative to Fight Human Trafficking programme (UN.GIFT)
- In African context: The Quagadougou Action Plan to Combat Trafficking in Human Beings, Especially Women and Children
- UNODC has developed a United Nations Counter – Kidnap Manual on best practices for law enforcement authorities to combat kidnapping

Governance challenges and constraints

Lawlessness at sea

Maritime Security off the African continent is under threat as a result of lawlessness at sea. Often there is a lack of sufficient or suitable naval assets to protect territorial waters. Under the current SADC Maritime Security Strategy, and following an agreement signed between Tanzania, Mozambique and South Africa, military deterrence involves the deployment of South African navy to patrol waters. The strategy also includes a South African driven naval –intelligence hub, both resulting in its own challenges, one being that is very costly for South Africa.

Criminal activity at sea is a product of establishment: socio – economical issues

Criminal Activity at sea does not only refer to piracy it also includes, money laundering, illegal arms and drug traffic, piracy and armed robbery at sea, illegal oil bunkering/crude oil theft along African coasts, maritime terrorism, human trafficking, human smuggling and asylum seekers travelling by sea. It is important to understand the context of the continent itself, using piracy as an example: “pirates are not amphibious creatures – the root causes of piracy are not found at sea but on land.”⁶ Socio-economical issues⁷, such as land-based poverty and political instability need to be contained. The African continent has its own unique issues but often the research is lacking.

⁶ Coelho, J, Southern African maritime security: problems and prospects, p5

⁷ The African continent also face the following socio-economic problems: unbalanced distribution of wealth, unemployment, armed conflicts, poor law enforcement system, degraded environment, poor governance, societies under stress, corruption, lack of education, lack of respect for universal human rights and discrimination, increased demand for sex trade and sex tourism.

- **Different methods of operation is used by pirates off the east coast of Africa vs the west coast**

In West Africa cargo is the target and not crew as commodities to bargain for ransom, crew more likely to be killed outright (piracy and armed robbery – latter can also be when vessel is at port)

- **Sea Lanes of Communication are being hindered**

There is a responsibility on African states to keep their SLOC open and to provide unhindered use of African seas as well as access to African ports for the import and export of goods by sea. Failing which disrupts trade with dire consequences not only for surrounding littoral states but also landlocked states.

Increased cost of providing security – erodes the sustainability of shipping.⁸

Recommendations: Strategies to improve maritime safety and security

Lawlessness at sea

- “Promote maritime security coordination and co-operation between and among States, regions, organizations and industry, including enhanced civil / military cooperation
- Promote and strengthen guidance on preventative, evasive and defensive measures to protect ships from security threats
- Assist Member States in enhancing implementation of IMO security measures, with a multi-agency approach to address vulnerabilities of ships and ports
- Support United Nations and other IGO’s efforts in the fight against global terrorism and related threats to maritime transport and global trade security
- Support full and effective ISPS implementation in ports worldwide (to ensure ports are on white list at IMO and are therefore secure for trading)
- Support regional measures to address maritime security risks and efforts to share information, knowledge and resources in combating all forms of maritime crime.”⁹
- More flexible and participatory strategies
- Establish or strengthen support and coordination centers

⁸ IMO – A concept of a sustainable maritime transportation system (2013) p17

⁹ ibid at p 28

- SADC Maritime Strategy to be more regional – “The way forward implies three fundamental steps towards achieving the paradigm of good order on the seas of the region”:
 - “gradually centralizing the effort by looking for a solution in which SADC member states other than South Africa, particularly coastal ones, have bigger roles and responsibilities
 - seek the inclusion of non-security stakeholders, and the adoption of good practices” (source: Coelho p 10)

- In respect of piracy and armed robbery the 2050 AIM strategy promotes: “cooperation with the IMO and any other relevant organizations, to mutualize their assets so as to cooperate to the fullest possible extent in the repression of piracy and armed robbery against ships: This would be with a view towards: encouraging (a) burden sharing, (b) tracking financial flows, (c) sharing and reporting relevant information, (d) interdicting ships and/or aircraft suspected of engaging in piracy or armed robbery against ships, (e) apprehension and prosecution of persons committing or attempting to commit piracy or armed robbery against ships, and (f) facilitating proper care, treatment, and repatriation for seafarers, fishermen, other shipboard personnel and passengers subject to piracy or armed robbery against ships, particularly those who have been subjected to violence.”¹⁰

Look at what has been done, what has been achieved – thus lessons learnt especially passing lessons learnt from East Africa to West Africa – i.e: the need for states to create legislation criminalizing piracy and conspiracy to commit piracy, pursuant of their membership of international conventions such as UNCLOS and SUA, and to become signatories to such convention if they have not yet done so.

Include all the stakeholders and consider what is feasible and what is not and to make sure that the rules we impose is actually possible, thus how realistic are the list of actions drawn

There is a need to harmonise national legal frameworks with regional frameworks to ensure that there are no opportunities for perpetrators to elude prosecution or extraction. In this regard land locked states need to be included in the regional framework and not only littoral states.

¹⁰ ibid at p25

Improved Socio – economic issues

- In addition to focusing on securing regional maritime borders, it is equally important to look at inshore factors/circumstances that are drivers for piracy and to attempt and address these drivers (thus a more holistic approach and less purely security – based)
 - The AU sets out in its 2050 AIM strategy: “The AU shall make an assertive call for preventative measures with efforts to address both real and perceived grievances and underlying social, economic, and political conditions which give rise to this content. Therefore, the AU, the RECs/RMs and Member States will give priority attention to addressing underlying conditions conducive to the spread of terrorism in the continent, as well as aspects for human rights and the rule of law. These conditions include: poverty, prolonged unresolved conflicts, dehumanization of victims of terrorism, lack of rule of law and violations of human rights, ethnic, national and religious discrimination, political exclusion, Corporate Social Responsibility (CSR), socio- economic marginalization and lack of good governance.

Fisheries and aquaculture

Fisheries and aquaculture are a vital component of the Blue Economy, making a significant contribution to GDP, providing employment, and promoting health and food security. A recent FAO study (2014) estimated the value of the fisheries and aquaculture sector in Africa (including marine and freshwater) at some \$24 billion, or 1.26 % of the GDP of all African countries. The sector employs 12.3 million people representing 2.1% of the continent’s working population, of which 27.3% are women.

Nevertheless, there is potential for the sector to make an even greater contribution. The FAO report, for example, also noted that 25% of marine catches around Africa are still made by non-African countries. In the Sub-Regional Fisheries Commission Area for example, 750 of the 1200 fishing vessels operating in the area are foreign. An estimated additional amount of \$ 3.3 billion could be generated if they were caught by African States. Moreover, there are significant losses from IUU fishing and aquaculture is currently underdeveloped in Africa.

The AU 2050 AIM Strategy recommends the development of a Common Fisheries Policy aimed at conserving, managing and harvesting fish stocks in line with the ecosystem and precautionary approaches and building on the 2005 Abuja Declaration on Sustainable Fisheries and Aquaculture in Africa, and the 2010 Conference of African Ministers of Fisheries and Aquaculture.

i. **Criteria for a sustainable fisheries and aquaculture sector/Vision**

Fisheries – regulatory framework

- All African States have ratified all relevant international and regional instruments
- National fisheries policies harmonized through the adoption of a Common Fisheries Policy
- Effective co-operation amongst AU Member States, RECs/RMs, RFM Organisations and LME programmes

Compliance and enforcement

Regional plans of action to combat IUU fishing in place. Such plans are in line with the 2005 Rome Declaration and the 2009 FAO Agreement and incorporate:

- Implementation of responsibilities w.r.t IUU fishing by flag, port and coastal States - including transshipment
- Effective fisheries monitoring, control and surveillance mechanisms – including Vessel Monitoring Systems, AI systems and base stations
- Harmonised measures on IUU fishing;
- Labelling and certification schemes.

Effective monitoring, control and surveillance mechanisms adopted at national level.

Economic incentives and other factors driving fleet overcapacity and IUU fishing removed

Stock management

- A higher percentage of fisheries resources in the AMD being fished by African fleet/s
- For those stocks still being fished by foreign fleets, better rates are agreed in the access agreements
- The process of progressive replacement of “open access” regimes with “limited access” regimes and introduction of rights-based fisheries (as per FAO Code of Conduct and 2005 Abuja Declaration) is completed
- Equitable allocation of resources and balance between small-scale and industrial fishers
- Ecosystem approach to fisheries management being implemented and environmental impacts minimised

Aquaculture

- Policies and incentives promoting the development of sustainable aquaculture in place
- Ecosystem approach to aquaculture (EAA) being implemented

- Increased co-operation amongst African countries in the promotion of sustainable aquaculture

ii. Overview of fisheries and aquaculture in Africa

Status of fisheries and aquaculture

Of the total value of the sector in Africa, some \$ 8.13 billion (33.8%) comes from marine artisanal fisheries, \$ 6.849 billion (285.%) from marine industrial fisheries, \$ 2.776 billion (11.5%) from aquaculture and the balance from inland fisheries. However, there are significant regional differences, with marine artisanal fisheries contributing around 70% of the value in a number of West and Eastern African countries (eg Senegal , Mozambique), while in Southern Africa (eg Namibia and South Africa), marine industrial fisheries are more important.

Most fish stocks are already fully exploited – and some over-exploited - but there is potential for further development of post-harvest processing in some countries. However, in West Africa, for example, this is at present constrained by the lack of infrastructure for landing and food safety controls. As a consequence, a large proportion of the catch is never landed in the region and even when it is, much of it is exported to Europe and Asia. Fish consumption in Africa is, at 9.1 kg/capita, the lowest globally (2009 data).

Aquaculture is generally underdeveloped and only makes a significant contribution to the GDP of a few African countries. Egypt, notably, produces 71% of the total African production (marine and freshwater) and is amongst the top 10 producers globally (2.2% of global production in 2010). The marine component comprises mainly finfish (99%), molluscs and crustaceans.

Overview of regulatory framework

❖ Binding Legal Instruments:

✚ International agreements

- UNCLOS - 1982/1994
- UN Fish Stocks Agreement - 1995/2011
- CBD – 1992/1993
- FAO Compliance Agreement 1993
- FAO Agreement on Port State Measures – re IUU 2009
- CITES 1973/1975

✚ Regional Instruments

- African Convention on the Conservation of Nature and Natural Resources (Maputo Convention, 2003)

- UNEP Regional Seas Conventions in Africa (Abidjan Convention, Barcelona Convention, Jeddah Convention, Nairobi Convention)

See Table (x) for status of ratification of above international and regional agreements by African countries.

- ✚ National legislation: most countries have at least primary fisheries legislation in place incorporating appropriate principles and management measures although it is sometimes out of date. In some cases there are no supporting regulations which hinders enforcement.
- ❖ Non-binding instruments:
 - FAO Code of Conduct on Responsible Fisheries – 1995;
 - International Plans of Action (IPOA) for i) reducing the incidental catch of seabirds in longline fisheries; ii) the conservation and management of sharks; iii) the management of fishing capacity (1999) and iv) to Prevent, Deter and Eliminate IUU (2001);
 - Reykjavik Declaration (2001) on responsible fisheries in the marine ecosystem;
 - Nouakchott Declaration on IUU (2001).
- ❖ Regional bodies: assist States in implementation of international agreements and decisions
 - ✚ **African Union - International Bureau for Animal Resources/AU-IBAR:** implements the *Pan African Fisheries and Aquaculture Policy and Reform Strategies* adopted by the Conference of African Ministers in charge of Fisheries and Aquaculture (CAMFA);
 - ✚ **Regional Economic Commissions (RECs):** develop regional fisheries programmes and collaborate with AU-IBAR in the implementation of the Pan African Fisheries and Aquaculture Policy and Reforms Strategies. They include the Economic Community of West African States/ECOWAS, the Common Market for Southern-Eastern Africa/COMESA, the Economic Community of Central African States/ECCAS, and the East Africa Community/EAC, Inter-Governmental Authority for Development/IGAD). They are interlinked with regional fisheries bodies.
 - ✚ **Regional Fisheries Organizations (RFBs, RFMO):** implement regional fisheries programmes.
 - Regional Fisheries Bodies – advisory/implementation (General Fisheries Commission for the Mediterranean/GFCM, Ministerial Conference on Fisheries Cooperation among African States Bordering the Atlantic Ocean/ATLAFCO; Sub-Regional Fisheries Commission/SRFC, Fishery Committee for the West Central Gulf of Guinea/FCWC; Regional Fisheries Commission of Central Gulf of Guinea/ COREP; Lake Victoria

Fisheries organization/LVFO, South-West Indian Ocean Commission/SWIOFC, Aquaculture Network for Africa/ANAF);

- Regional Fisheries Management Organizations – can adopt binding management measures (ICCAT, Indian Ocean Tuna Commission/IOTC, SE Atlantic Fisheries Organization/SEAFO).

🚦 **LME Commissions (BCC) and Programmes (CCLME, GCLME, ASCLME):** implement regional fisheries and environmental programmes generally in collaboration with the relevant RFBs/RFMOs, Commissions or Regional Seas Programmes.

iii. Governance challenges and constraints

Regulatory framework

- Not all States are Party to the relevant international and/or regional legal instruments (see Table?);
- National legislation is not always aligned with international and regional instruments and in many cases is out of date;
- In some countries artisanal fisheries are still managed on an open access basis as opposed to rights-based management, although there are some efforts to address this – for example, in Liberia and Senegal;
- There is a paucity of lawyers/legal advisers in the maritime/marine/fisheries field;
- There are a large number of regional bodies and organisations with an interest in fisheries and aquaculture. In some cases their mandates are overlapping. In addition, there are a number of programmes – which should be run under these bodies, but which are often run independently because of a lack of capacity;
- New requirements to manage the catch of and trade in sharks and manta rays now listed in CITES Annexes.

Compliance and enforcement

- National legislation is not properly enforced in many countries due to lack of capacity and, in many cases, inadequate monitoring, control and surveillance systems
- As a consequence, there is a significant amount of Illegal, unregulated and unreported fishing in both industrial and artisanal sectors (IUU fishing). In West Africa, for example, IUU catches are reported to be 40% of reported catches (Agnew et al, 2009) at an estimated value of \$ 100 million/year.

Management of stocks

In general, there is a lack of capacity at the national level to manage fisheries on a sustainable basis and prevent overexploitation. Contributing factors include:

- Inadequate information/data on status of stocks including the potential impacts of climate change on species distribution and habitats
- Insufficient research capacity
- Lack of co-operation around management of shared/ straddling stocks
- Losses to IUU fishing
- Conflict between short-term social objectives & long-term sustainability
- Open access fisheries as opposed to rights-based management
- Over-capacity, especially in the artisanal sector
- Lack of stakeholder participation
- Competition with other users (eg. oil and gas) – competition for space, energy, government support

Environmental Impacts

- Impacts on ecosystems, habitats and biodiversity
 - Impacts of aquaculture – loss of habitat, effluents, loss of alien spp into the wild, diseases
 - Destructive and harmful fishing practices (use of explosives and chemicals)
 - By-catch and discards – non-target fish and other species
 - Incidental catch of seabirds
 - Lost or abandoned fishing gear makes up 10% of all marine litter.

iv. Recommendations

Regulatory framework

- Promote ratification of relevant international and regional instruments and implementation of their provisions (including the FAO Code of Conduct on Responsible Fisheries)
- Adopt and implement a Common Fisheries Policy aimed at harmonizing national policies
- Clarify the mandates of the organisations in each region and identify lead agencies
- Promote intra-regional trade
- Develop food quality and assurance systems including regulating harmful fishing practices which lead to post-harvest losses
- Reduce the allocation of fishing rights to foreign vessels and where such rights are retained, there should be joint negotiations on access agreements.

Compliance and enforcement

- Regional co-operation in development of an effective monitoring, compliance and surveillance system – including development/strengthening of national coastguards, vessel monitoring systems (VMS) and AIS Systems and base stations;
- Development of regional plans of action to combat IUU fishing;
- Harmonise sanctions to avoid “waters” or “ports” of convenience.

Management of stocks

- Promote the Ecosystem Approach to Fisheries management
- Promote collaboration between fisheries bodies and relevant UNEP Regional Seas Programmes especially around EAF and EAA
- Development of joint management plans for shared resources/straddling stocks
- Promote the regulation of fishing effort by completing the process of replacing open access by limited access/ rights-based fisheries
- Increase research capacity to achieve an improved understanding of fish stocks to manage effectively

Environmental impacts

- Identify and protect critical ecosystems/habitats/species
- Implement FAO IPOA for the Conservation and Management of Sharks
- Field monitoring of critical habitats
- Regulate the use of destructive fishing gear and practices
- Introduce marine/maritime spatial planning to enhance protection of critical areas and reduce potential for conflict amongst resource users.

Aquaculture

- Mainstream aquaculture development under Pillar 3 of the Comprehensive Africa Agriculture Development Programme (CAADP) adopted by the AU in 2002
- Increase regional co-operation in aquaculture development eg. provide guidelines for technology transfer mechanisms from countries advanced in aquaculture (eg. Nigeria, Egypt) to other countries on the continent – for example, best practice guidelines
- Harmonise aquaculture policies and regulatory frameworks for aquaculture in shared ecosystems
- Improve enabling environment for investment and governance
- Development of Public-Private sector Partnership (PPP) in aquaculture
- Promote Ecosystem Approach to Aquaculture (EAA)

- Certification of aquaculture products (based on FAO Guidelines)
- Suitable biosecurity systems must be in place if alien species are utilised

TABLE: AFRICAN MEMBERSHIP OF FISHERIES-RELATED INTERNATIONAL AND REGIONAL CONVENTIONS

To be completed

COUNTRY	CONVENTION							
	UNCLOS ¹¹	UN Fish Stocks ¹²	CBD	FAO Compliance	FAO – Port State Meas.	CITES	MAPUTO Convention	Regional Seas Conv
Algeria	1996							Barcelona
Angola	1990							
Benin	1997							
Botswana	1990							
Burkina Faso	2005							
Cameroon	1985							
Cape Verde	1987							
Chad	2009							
Comoros	1994							Nairobi
Congo (Br)	2008							
Cote d'Ivoire	1984							Abidjan
Djibouti	1991							
DR Congo	1989							
Egypt	1983							Barcelona
Equatorial Guinea	1997							
Gabon	1998							Abidjan
Gambia	1984							
Ghana	1983							Abidjan
Guinea	1985	2005						
Guinea-Bissau	1986							
Kenya	1989	2004						Nairobi
Lesotho	2007							
Liberia	2008	2005						

¹¹ As at 3 October 2014

¹² Ibid

v. References

FAO (2014). The State of World Fisheries and Aquaculture: 2014.

Unsustainable use of non-living resources

Governance of Offshore Mining Activities

Governance of offshore mining activities comprises two regimes:

- i) that covering the International Seabed Area (the Area) i.e. “the seabed and ocean floor and subsoil thereof beyond the limits of national jurisdiction”; and
- ii) that applicable to the sovereign territories of coastal States.

1.1 The International Seabed Area

The mineral resources of interest on the deep sea-bed are mainly what are called manganese nodules. They were discovered over a century ago and occur mainly in areas beyond the edge of the continental shelf in water depths of around 3,500 meters. The nodules are high-grade metal ores of varying composition but typically contain high levels of manganese, iron, nickel, copper and cobalt. The biggest deposits are in the north central Pacific.

Despite the fact that they would be expensive and difficult to mine, there was significant commercial interest in them, initially mainly from developed countries. The issue was raised at the UN General Assembly in 1967 and led to the adoption in 1969 of a Moratorium on the exploitation of these resources until the establishment of an international regime. In 1970 a set of principles relating to the deep sea-bed was adopted which recognised it as the common heritage of mankind, that it was not subject to appropriation or sovereign rights, and that all rights and activities would be subject to an international regime. Provisions were then incorporated into Part XI of UNCLOS, which sets out general provisions, principles and policies relating to the Area and its development, as well as details of the structure and functioning of the International Seabed Authority (ISA). However, certain States objected to the provisions of Part XI and although in agreement with the rest of the UNCLOS provisions, refused to ratify UNCLOS. This resulted in further consultations and the adoption of an Implementation Agreement in 1994 which effectively modifies some of the provisions of Part XI.

1.1.1 UNCLOS Provisions

Article 156 of UNCLOS establishes the ISA which is responsible for all activities related to the exploration and exploitation of mineral resources in the Area which comprises about 60% of the sea-bed. It does not govern other uses of the Area, such as pipeline and cable-laying or scientific research. The ISA consists of:

- The Assembly
- The Council and
- The Secretariat.

All Parties to the LOSC are members of the ISA and its Assembly to which all other structures are accountable. It can adopt policies for the ISA – consistent with the LOSC – and is responsible for electing the Council and Secretary General of the ISA, and the Governing Board and Director General of the Enterprise; the budget and various rules pertaining to the governance system.

The Council is responsible for the implementation of the regime. It consists of 36 members, elected on the basis of specific requirements: for example, it must include 6 members from developing Parties with special interests, such as landlocked States, States which are major importers of the minerals to be mined in the Area etc. It has a complex decision-making procedure with many checks and balances aimed at safeguarding the interests of States.

The Council has two subsidiary bodies: the Economic Planning Commission and the Legal and Technical Commission. The former makes recommendations on economic aspects including protection measures and a system of compensation, while the latter has broader responsibilities. These include making recommendations on mining applications, environmental protection and compliance measures. It also drafts the rules and regulations of the ISA.

An additional organ of the ISA is the Enterprise which engages directly in prospecting and mining in the Area, as well as processing and marketing of the minerals. It operates under a Governing Board, with day-to-day control being the responsibility of the Director General. It is accountable to the Assembly, but operates in a similar manner to commercial operators, although its profits are distributed by the ISA. Exploration for and exploitation of mineral resources requires specific authorisation by the ISA. Applicants must meet specific qualifications and must agree to comply with the Convention and associated rules – including technology transfer to the Enterprise and anti-monopoly criteria. Disputes arising from these procedures are subject to the jurisdiction of the Sea Bed Disputes Chamber. Applicants are also required to identify two sites of equal estimated commercial value, one of which will be reserved for development through the Enterprise. The Enterprise contributes to the realisation of the “common heritage” by passing technology on to nationals of developing States and via the Authority’s share of its profits.

1.1.2 The Implementation Agreement

A number of States which had already invested in deep sea mining objected to the provisions of Part XI and although in agreement with the rest of the UNCLOS provisions, refused to ratify UNCLOS. The Secretary General therefore convened informal consultations between 1990 and 1994, with a view to securing universal ratification of UNCLOS. The consultations resulted in a compromise Agreement on the Implementation of Part XI of UNCLOS (Implementation Agreement) which was adopted by the GA on 28 July 1994 and came into force on 28 July 1996.

Despite the fact that reservations are not permitted by UNCLOS and amendments can only be made by State Parties, the Implementation Agreement modifies certain provisions of Part XI. For example, it simplifies the structure of the Authority to make it more cost-effective, and introduces new safeguards for the interests of deep sea bed miners. Under Article 2 of the Agreement, Part XI must be interpreted and applied together with the Agreement as a single instrument, but the Agreement will prevail in the

event of any inconsistency between them. Article 4 provides that States who ratify or accede to the Convention after 28 July 1994 will be bound to the Implementation Agreement as well.

The International Seabed Authority became fully operational in 1996 and has its headquarters in Kingston, Jamaica.

1.2 Governance of offshore mining in coastal States

While coastal States have the right to exploit any mineral resources in areas of the seabed under their jurisdiction, such activities are nevertheless still subject to the provisions of applicable Conventions - for example, those dealing with pollution. Although there is no specific International Convention dealing with pollution arising from offshore exploration and exploitation activities, the UNCLOS and MARPOL deal with it to some extent. Article 208 of UNCLOS, for example states:

1. *“Coastal States shall adopt laws and regulations to prevent, reduce and control pollution of the marine environment arising from or in connection with seabed activities subject to their jurisdiction and from artificial islands, installations and structures under their jurisdiction, pursuant to articles 60 and 80.*
2. *States shall take other measures as may be necessary to prevent, reduce and control such pollution.*
3. *Such laws, regulations and measures shall be no less effective than international rules, standards and recommended practices and procedures.*
4. *States shall endeavour to harmonize their policies in this connection at the appropriate regional level.*
5. *States, acting especially through competent international organizations or diplomatic conference, shall establish global and regional rules, standards and recommended practices and procedures to prevent, reduce and control pollution of the marine environment referred to in paragraph 1. Such rules, standards and recommended practices and procedures shall be re-examined from time to time as necessary.”*

As far as MARPOL is concerned, Regulation 21 of Annex I specifically provides that fixed and floating rigs, when engaged in the exploration, exploitation and associated offshore processing of sea-bed mineral resources, must comply with the requirements of Annex I applicable to ships of 400 tons gross tonnage and above other than oil tankers.

Similarly, Annex V contains special provisions for the disposal of garbage from fixed or floating platforms engaged in the exploration, exploitation and associated processing of seabed mineral resources which are actually stricter than those for other vessels.

At the regional level, some of the UNEP Regional Seas Conventions contain provisions on offshore activities and, in some cases, Technical Protocols. Article 8₂ of the Nairobi Convention, for example, provides for pollution from sea-bed activities.

In general, however, there needs to be strong regulation at the national level. With respect to pollution, for example, in addition to the ongoing potential for major incidents from offshore oil and gas installations – with impacts on both local communities and the environment – the cumulative effects of numerous smaller incidents and operational discharges could be significant as the number of wells

grows. Moreover, with the growing number of platforms in the area there is potential for conflicts with fisheries interests, not only due to pollution, but as a consequence of habitat degradation and physical exclusion from drilling areas and abandoned rigs. At the same time, many of the companies involved are international, and there are problems of accountability.

Examples of countries which have introduced controls include:

- Madagascar: There is a policy on pollution, and framework environmental legislation. A relatively recent development has been the introduction of a requirement for environmental impact assessments for a variety of oil and gas related activities, including exploration, exploitation, pipelines, refineries and storage.
- South Africa: Offshore mining activities are regulated by the Department of Minerals and Energy in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) which states that:
 - - The environmental management principles in terms of the National Environmental Management Act (NEMA), 107 of 1998, are applicable;
 - The holders of mining permits are responsible for managing and remedying any impacts, and are liable for any damages;
 - The holders of mining permits are required to prepare an Environmental Management Plan in consultation with relevant government agencies.

They are also listed as one of the activities which, in terms of the National Environmental Management Act, 107 of 1998, is required to undergo an Environmental Impact Assessment prior to commencement.

Overview of the Offshore Petroleum and Minerals Industry in Africa

2.1 The Oil and Gas Sector

2.1.1 West African Coast

Petroleum exploration and production in the waters of West Africa from Guinea-Bissau to South Africa date from World War II or even earlier. However, significant oil production in Nigeria, Gabon and Angola began in the 1960s and massive investment into exploration and production has taken place throughout the region since the 1990s. The most significant development in the offshore petroleum industry is the discovery and production of oil from ever-increasing water depths i.e. from depths well over 1000 metres. The technology that has permitted this has led to previously neglected areas, e.g. off Ghana, becoming the most recent focus of development.

2.1.2 Western Indian Ocean

The Western Indian Ocean has long been viewed as having potential for oil and gas. Exploration activities in the region date back to at least the 1950's but, despite some positive results, tapered off with the drop in the oil price in the mid-1980's. More recently there has been renewed interest in the

area as a result of improved information on and understanding of the geology of the area, discoveries of onshore oil reserves and gas finds offshore of Mozambique (Pande and Temane) and Tanzania (Songo Songo) (Boote and Matchette-Downes (undated)). Exploration has thus resumed – or is scheduled to be resumed shortly – in a number of areas while exploitation is already taking place in Madagascar, Tanzania, Mozambique and South Africa.

2.2 Marine Diamond Mining

Marine diamond mining is an activity unique to a limited area lying north and south of the Orange River which forms the boundary between Namibia and South Africa. Diamonds are being recovered from water depths of up to 130 m and occur in gravels overlying the bedrock. Exploration for marine diamonds has taken place off northern Namibia but, to date, no commercially significant finds have been made.

2.3 Other Marine Minerals

Interest has been shown in glauconite (phosphate) deposits and manganese nodules along the west coast of southern Africa but the cost of recovering these minerals has proved to be prohibitive up to now. Sand, for harbour development and other construction activities, can be taken from suitable deposits throughout the West African region. These sand sources have to be close to the development projects in question to be commercially viable.

On the East Coast, the US Geological Survey (2009) reported that Mauritius has polymetallic nodules on the ocean floor at a depth of about 4,000 meters (m) and extending from 400 kilometers (km) to 800 km north of Port Louis. The nodules average more than 15% iron and manganese and more than 0.35% cobalt.

Impacts

Offshore prospecting and mining activities have a range of environmental impacts, primarily habitat destruction and various forms of pollution. The activities involved - all of which contribute to these impacts - include:

Exploration phase:

- seismological surveys (surveys of the seabed and its subsoil, including sample taking)
- exploration drilling.

Exploitation phase:

- establishment and operation of drilling platforms which include accommodations for the personnel
- development drilling
- recovery, treatment and storage of the resource
- transportation to shore by pipeline and/or ships
- maintenance, repair and ancillary operations.

Pollution can occur both as a consequence of accidents and operational discharges. Accidental discharges can be as a result of blow-outs, pipeline ruptures, tanker spillages and collisions – for example, when ships are docking at the platforms. Operational discharges include oil in produced water, drill cuttings and muds (which may contain toxic contaminants), production chemicals (e.g. residual process water, drilling additives, well treatment fluids), sewage, garbage, deck drainage, and atmospheric emissions.

Since many of the types of pollution and related impacts are similar to those from other vessels, which have been dealt with elsewhere in the course, the focus here is on those which are more specific to this sector.

3.1 Geophysical Prospecting

Common to offshore petroleum, marine diamond, and other mineral exploration is the use of geophysical techniques in prospecting. The acoustic sources, e.g. air guns, used in seismic surveys for oil, and the side-scan sonars and sub-bottom profilers used in diamond and other mineral prospecting could be considered to be sources of “noise pollution”. However, noise is generally not considered alongside atmospheric emissions, marine discharges, oil spills, etc. as marine pollution. The assessment of the potential impact of acoustic sources in geophysical prospecting is a major field in itself and the reader is referred to reviews such as McCauley (1994) for further information on this topic.

3.2 Drilling Muds and Cuttings

Drilling mud, or drilling fluid, serves a number of important functions in the drilling process – such as carrying the cuttings to the surface and cooling and lubricating the drill bit. Drilling muds consist of a continuous liquid phase, either water (Water-Based Muds) or oil (Non-Aqueous Drilling Muds), added to which are various chemicals to produce the required operational mix. No two drilling muds are exactly the same in composition because they are “customized” for the specific conditions in each well. The main impacts related to the use and discharge of drilling muds and cuttings are related to:

In the sediments:

- Toxicity of chemicals (organic chemicals and heavy metals, for example, in barite);
- Burial of organisms (smothering effects);
- Change in sediment structure – grain size (change in habitats);
- Oxygen depletion in the sediment pore waters (due to biodegradation of contaminants attached to drilling-derived particulates deposited on the seabed);

In the water column:

- Toxicity of chemicals (drilling fluids);
- Physical effects of suspended matter (e.g. elevated turbidity)

Typically the main impact of the discharge of drilling-derived wastes (mainly particulates and associated pollutants) is on the benthos. The extent of the impact is determined by the *accumulation of material on the seabed*, which in turn is determined by the amount and physical characteristics of the material being

discharged and the environmental conditions that disperse these discharges. Whilst *smothering or burial effects* and *habitat change* due to changing sediment sizes may occur in the more immediate vicinity of the discharge, of greater significance generally is the presence of components in the drilling-derived wastes (drill cuttings and/or muds) having *toxic effects* that typically result in more widespread impacts (e.g. Sadiq *et al.*, 2003a,b). Re-suspension of sediments can lead to a short to medium term accumulation of fine components of the drilling wastes (e.g. barite and bentonite) in the benthic boundary layer extending some distance from the discharge and resulting in the exposure of benthic epibiota to the physical impacts of low concentrations of drilling-derived particulates over extended periods (e.g. Smit *et al.*, 2006).

In addition, increases in concentrations of suspended material in the water column associated with the discharge of drilling wastes (drill cuttings and muds), may have *deleterious effects on water column or reef-dwelling biota depending on the magnitude of the increase in turbidity and the duration of exposure* to these elevated turbidities. These effects typically are more transient and include both physical and chemical effects such as the reduction in photosynthetically available radiation, clogging of gills, ingestion of particulates of limited or no nutritional value and the effects of their absorbed toxins (e.g. Smit *et al.*, 2006).

There is broad consensus that the impact of discharged drilling muds and cuttings is the most severe with Non-Aqueous Drilling Muds (NADMs), with Water-Based Muds having the least effect (OGP, 2003). In general WBM are considered to be relatively benign because they usually do not result in hydrocarbon enrichment of sediments (OGP, 2003). Their impact is thus mainly physical and depends on the energy environment on the seafloor i.e. whether the sediments can be distributed by storm wave action or strong bottom currents. In deeper, low energy environments, cuttings accumulations and minor biological impacts were observed a year after drilling was completed (Gilmore *et al.*, 1985). On the other hand, NADMs can have ecotoxicological impacts especially at the sub-lethal level. This is one of the reasons for the enforcement of stricter environmental requirements for discharges of drilling cuttings in a number of countries, with some even completely prohibiting them.

3.3 Produced Formation Water

When oil is produced it reaches the surface in association with produced formation water (PFW) and gas. Both PFW and gas are produced throughout the life of an oil field and thus potentially can have a chronic impact on the environment. Produced formation water is subject to a variety of treatments to enhance the yield of oil but the “cocktail” of compounds used render assessment of impacts difficult. The impact of the atmospheric emissions resulting from flaring of gas has been little studied. However, more and more countries have introduced a “no flaring” policy with respect to all new oil fields thus atmospheric pollution from oil production should become a less important issue with time.

Produced formation water (PFW) occurs in association with oil and gas in the reservoir formation rocks. The volume of PFW present depends upon the structure of the formation, reservoir management (production) techniques and the duration of production of oil from a particular field. Produced formation water naturally contains a wide variety of compounds and elements which originate from the producing formation. These include solutions of mineral salts, oil, gas, low molecular weight hydrocarbons, organic acids, heavy metals, naturally-occurring radioactive materials (NORMs), and suspended particles. In addition, as part of the production process, a variety of chemicals are added to the raw hydrocarbon/PFW stream to facilitate separation of the oil from the PFW and to prevent

deterioration of production facilities e.g. corrosion inhibitors and biocides. The separated PFW can either be discharged to sea or re-injected into the well depending upon the location of the producing field, economic considerations and the regulatory framework.

The separated PFW, which is either discharged or re-injected, contains residual volatile and non-volatile hydrocarbons not removed by the separation process, elements and compounds derived from the reservoir formation, and chemicals added to the production stream. Some of these chemicals or materials, e.g. low molecular weight alcohols and carbohydrates, and ammonia, may be utilised by marine micro-organisms (bacteria) or, as in the case of benzene, toluene, ethylbenzene, xylene (BTEX) and heavy metals, are toxic to such organisms.

Once discharged into the sea the components of PFW may be dispersed widely, volatilised, metabolised by bacteria and other organisms, or adsorbed to naturally occurring particles. In the latter case the particles sink to the seafloor where they are either sedimented or ingested by benthic organisms.

The impact of the discharge of produced formation water on the water column and seabed depends on the rates and balances of these various physical (dispersion and sedimentation) and degradation (metabolic) processes. Unlike the discharge of drilling muds and cuttings the discharge of PFW is a chronic process which may last for the duration of the production life of a particular well. Furthermore, if re-injection is a major feature of the production process the composition of the PFW may change during the life of the well.

Maritime transport

Shipping pressures on the Marine Environment

Shipping is essential to the global economy, providing the most cost-effective means of transporting bulk goods over great distances. Over 90% of all global trade is carried by ships, with some 50,000 merchant ships sailing the world's oceans, with a combined tonnage of around 600 million gross tonnes. These vessels transport everything from food and fuel to construction materials, chemicals, and household items. In 2003, around 6.1 billion tonnes of cargo was shipped by sea, covering a collective distance of over 6 million kilometres.

The world fleet has become progressively more diverse, and now includes some highly specialised vessels, particularly those that transport hazardous chemicals and radioactive substances. Tankers are most commonly associated with crude oil, but may carry a variety of refined petroleum products as well as liquefied petroleum gas and natural gas. There are also tankers which carry fresh water, wine and even orange juice. Bulk carriers typically carry high-density commodities such as grain, coal and mineral ores (eg. iron ore). Container ships are a relatively new category but the numbers have grown significantly as a result of the efficiency with which they are able to operate. Passenger ships include both cruise liners, and ferries.

Unfortunately though, ships and ship-related activities have a number of negative impacts on the environment. These fall into two main categories:

- They are sources of various types of pollution; and
- They serve as vectors for the introduction of invasive species.

Pollution from Ships

Shipping is a significant source of marine pollution, both as a consequence of routine operational discharges and from shipping accidents which can result in the spillage of fuel and whatever cargo the vessel is carrying. Moreover, although shipping does not contribute as much as land-based sources, shipping-related pollutants are generally concentrated in busy shipping lanes and ports. As the world fleet has grown, shipping lanes have become more and more congested, the level of pollution caused by shipping has increased, as has the chance of spills and accidents. Ports also tend to be located in or near sensitive environments such as estuaries or bays, which include habitats like seagrass meadows, salt marshes, mangroves and mudflats.

Ships also contribute to atmospheric pollution, while the process of ship recycling has also raised environmental and health concerns.

Oil

The pollutant most commonly associated with shipping is oil - largely due to the massive and high profile oil spill incidents which have happened over the years. However, of the estimated 3.2 million metric tonnes of oil entering the marine environment annually in the early 1980's, only 44.4% was attributed to maritime transportation. 38.4 % of this volume came from terrestrial sources (industrial and municipal discharges and urban runoff), another 1.6% from offshore exploration and production facilities, 6.3 % from natural sources (seeps from exposed, oil-rich sediments), and 9.4 % from atmospheric sources.

Based on the above data, around 50% of the oil inputs associated with maritime transport are a result of shipping incidents involving groundings, collisions, hull failures or fires. Another 34% are a consequence of operational spills, with the remaining 16% unknown.

However, in recent years, the number of oil spills has declined substantially, and thus the relative contribution of shipping to total oil inputs is likely to have declined.

Hazardous chemicals

A wide range of chemicals is transported by sea, either in bulk in specialised chemical tankers or gas carriers, or in packaged form – for example, in drums in containers. Moreover, estimated at 25 million tonnes in 1985, it is predicted that the annual seaborne chemical trade will grow from the current 151 million tonnes to 215 million tonnes by 2015. In response, the chemical tanker fleet is forecast to

increase from 41 to 59 million DWT over the same period. Nevertheless, the volume of chemicals transported is much less than oil – especially if both oil cargoes and fuel oil are considered – and as a consequence, the number of spills is lower. Chemical tankers can carry between 400m³ to 40,000 m³, while gas carriers can have a capacity up to 100,000 m³.

On the other hand, the potential impact is much higher, depending on the exact nature of the chemical/s involved, and may include human health effects. Chemicals are considered as “Hazardous and Noxious” if they are:

- Flammable
- Explosive
- Toxic
- Corrosive
- Reactive

Cargoes may also include radioactive or infectious substances.

Spills or losses of chemical cargoes can be as a result of collisions – either at sea or in port – groundings, foundering, fire/explosion, equipment failure, and cargo transfer. Losses of containers may also occur while at sea as a result of poor weather conditions. While data on chemical spills is quite limited, a recent IMO study on product and chemical tankers reported 3,231 accidents globally between 1990 and 2005 – over 200 per annum. The Through Transport Club (who insure the majority of container lines) estimate that some 2,000 containers are lost overboard annually. However, there was no indication as to how many of these contain hazardous substances.

In 1999, France presented a summary of 23 case studies of chemical spills to a meeting of the Contracting Parties to the Bonn Agreement - a mechanism by which the North Sea States, and the European Community, work together to detect and combat pollution in the North Sea Area from maritime disasters and chronic pollution from ships and offshore installations. These included bulk and packaged chemicals from various hazard categories, including chlorine, pesticides, sulphuric acid, xylene and butane.

Sewage

There is limited information on the volumes of sewage discharged from ships. However, it is estimated that cruise ships – which can carry up to 5,000 passengers and crew – can discharge around 100,000 litres of sewage a day. In contrast, a bulk carrier with a crew of around 25, discharges around 300 litres a day. This excludes graywater such as laundry, shower, and galley sink wastes, which are produced in even higher volumes and which may include oils, nutrients, detergents, heavy metals, pesticides and even medical and dental wastes.

Although most data sets group cruise ships with ferries, it is estimated that there are currently at least 300 such vessels in the world fleet. Assuming that they operate 300 days a year, the cruise ships alone would discharge some 9 million tonnes.

Of particular concern, is that cruise ships frequently dock very close inshore in sheltered, sensitive coastal environments, where discharges are less likely to be diluted.

Chemical tankers may also discharge tank washings, although for the more hazardous chemicals, these are supposed to be discharged to port reception facilities.

Garbage

All ships – and again, particularly passenger ships - also generate normal household garbage, as well as medical wastes, and materials related to vessel maintenance. Food wastes, for example, are estimated at 1.4 – 2.4 kg/person/day i.e. 10 tonnes/day for a passenger ship carrying 5,000 people. Plastics are of particular concern, and arise not only from domestic waste, but also from, for example, fishing nets and ropes. Apart from plastic pollution being aesthetically unpleasant, the entanglement of marine animals such as seabirds, seals and turtles is also a serious problem.

Air pollution

Ships contribute to air pollution in a variety of ways from the burning of fuel, to incineration of wastes and the operation of refrigeration/air conditioning systems and fire-fighting equipment. The poor quality of exhaust emissions are largely related to the fact that many ships burn residual oils which contain enhanced levels of sulphur and heavy metals. As a result, a 1990 report indicated that:

- **Sulphur emissions** (SO_x) from ships' exhausts were estimated at 4.5 to 6.5 million tons per year - about 4 percent of total global sulphur emissions.
- **Nitrogen oxide emissions** (NO_x) from ships were put at around 5 million tons per year - about 7 percent of total global emissions. Nitrogen oxide emissions cause or add to regional problems including acid rain and health problems in local areas such as harbours.
- **Emissions of CFCs** from the world shipping fleet were estimated at 3,000-6,000 tons - approximately 1 to 3 percent of yearly global emissions.
- **Halon emissions** from shipping were put at 300 to 400 tons, or around 10 percent of world total.

Shipping is also considered to account for some 1.4% of CO₂ emissions.

Although the shipping industry is a relatively small contributor to the total volume of atmospheric emissions compared to road vehicles and public utilities such as power stations, it is significant in some regions, particularly where there are high densities of shipping.

Anti-fouling coatings

Shipping is recognized across the world as one of the most important pathways for marine invasives which can be transported not only in ballast water, but on ship's hulls and other exposed surfaces. Hull-fouling however, is also a problem in terms of the efficient operation of the ship as it creates drag and pushes up the fuel requirements. Substantial efforts have therefore been directed towards addressing this problem.

The predominant technical approach to managing biofouling is a combination of the application of an appropriate anti-fouling system in combination with regular maintenance and cleaning. Anti-fouling systems generally comprise a coating, paint, surface treatment, or other device which prevent the attachment of organisms in one of two ways:

1. The coating contains biocides or non-toxic active agents which gradually leach from the coating, thereby inhibiting the settlement of marine organisms;

2. The coating prevents successful attachment of marine organisms – mainly fouling-release or metallic coatings.

The most common biocides used include copper, lead, arsenic and mercury, and more recently, Tributyltin (TBT). TBT was first used as a biocide in a coating patented in 1976, and became widely used because of its effectiveness, being toxic at extremely low (parts per trillion) levels. This high toxicity however, soon started causing significant problems in a wide range of marine biota in the marine environment – particularly along shipping routes – and led a global ban on the application of TBT containing paints from 2003. Copper-based paints are, however, still used.

Ship Recycling

At the end of their economic life, ships are generally taken to ship recycling yards where they are dismantled and the parts distributed to recycling centres or agencies. In recent years there has been increasing concern around environmental and health concerns, both at the yards themselves - most of which are situated in developing countries – and in adjacent areas.

The problems arise from the fact that ships, in addition to steel and other useful materials, contain many substances that are banned or considered dangerous – for example, Asbestos and polychlorinated biphenyls (PCBs). In many countries, the costs of removing them from the vessel would not be economically viable because of the expensive insurance and potential health risks. However, due to a lack of appropriate controls, shipyards in the developing world can operate without such concerns. Aside from potential impacts on the health of the yard workers, the lack of controls enables the escape of highly toxic materials into the environment with implications for the health of the local population and adjacent ecosystems.

Introduction of invasive alien species

An Invasive alien species is one which has established and spread – or has the potential to do so – in an area outside of its natural distribution range, and which then threatens ecosystems, habitats and/or other species, potentially causing economic and/or environmental damage, or harm to human health. Invasive alien species are now generally recognised as one of the greatest threats to biodiversity globally, affecting it by displacing native species, altering community structure, food webs and ecological processes. They have now been documented in the majority (84%) of the world's 232 marine ecoregions, with particularly high levels of invasion in Northern California, the Hawaiian Islands, the North Sea, and the Eastern Mediterranean.

A recent analysis, drawing on information from over 350 databases and other sources, showed that for the 329 marine invasive species considered, shipping was the most common pathway (69%), with others being aquaculture (41%), canals (17%), the aquarium trade (6%), and live seafood trade (2%)¹². Of the 205 species introduced via shipping – and for which sufficient information was available – 39% were introduced by hull-fouling, 31% via ballast water, and the remainder by either or both.

While there can be many direct and indirect impacts of invasive marine species, the principal consequences can be grouped into three main categories:

- Ecological impacts occur when the local biodiversity of the area and/or the ecological processes are altered by the invasive species;
- Economic impacts - including losses as a consequence of reduced productivity, and costs incurred for the prevention and management of invasive species; and
- Public health impacts: Ballast water can transfer a range of species including bacteria, viruses and microalgae such as those called Harmful Algal Blooms (HABS) with consequential health impacts. Some cholera epidemics, for example, have been directly associated with ballast water discharges. The threat of health impacts also forces the closure of mariculture facilities rearing filter-feeding shellfish species, which tend to accumulate the micro-algae and associated toxins in their tissues.

Ports and Harbours

Ports and harbours play a vital role in the shipping industry as the interface between vessels and land-based activities. They are particularly prone to pollution, because they are generally constructed in sheltered environments – or are designed to create the required shelter – and thus have poor water circulation. At the same time, there are usually many industries located in and around harbour areas, and which discharge pollutants into harbour waters, where they tend to accumulate.

Industries associated with harbours are diverse but frequently include fish factories, ship building, repair and maintenance activities, while the loading and/or discharge of cargo and fuel can also be a source of pollution. In the case of oil, for example, records suggest that around 92% of oil spills occur during terminal operations. Pollutants in harbours can therefore include:

- Suspended solids
- Biodegradable organic matter
- Nutrients
- Heavy metals
- Toxic organic compounds (e.g. petroleum hydrocarbons, antifouling paint)
- Pathogenic organisms (e.g. bacteria and viruses)
- Exotic organisms
- Plastics and other litter

The Management of Environmental Threats from Ships

At the international level, the management of environmental impacts from ships is underpinned by the IMO conventions, which provide a comprehensive international regulatory framework for this global industry. These international provisions then need to be made applicable in the areas under national jurisdiction through national legislation. The regulatory framework was discussed in some detail in Module 2, so the focus here is on implementation of these provisions through technical and other supporting measures.

The development and amendment of the IMO Conventions dealing with environmental threats from shipping - as well technical guidelines and other measures to facilitate the implementation thereof - is

the responsibility of the Marine Environment Protection Committee (MEPC) of the IMO. It meets every eight months, and at any time has a number of different Working Groups depending on what the priority issues are. One of the current Working Groups, for example, is the GESAMP – Ballast Water Working Group.

Prevention of operational pollution

This is achieved by introducing mandatory anti-pollution measures into the design, equipment and operation of ships. Compliance with these requirements is then monitored through Port State Control. There are many such measures, and only some examples are outlined below.

Discharge criteria

Operational discharges of oil from tankers are allowed only when all of the following conditions are met:

- the total quantity of oil which a tanker may discharge in any ballast voyage whilst under way must not exceed 1/15,000 of the total cargo carrying capacity of the vessel, and 1/30,000 for new oil tankers;
- the rate at which oil may be discharged must not exceed 60 litres per mile travelled by the ship; and
- no discharge of any oil whatsoever must be made from the cargo spaces of a tanker within 50 miles of the nearest land.

Load on Top System

On a ballast voyage the tanker takes on ballast water (departure ballast) in dirty cargo tanks. Other tanks are washed to take on clean ballast. The tank washings are pumped into a special slop tank. After a few days, the departure ballast settles and oil flows to the top. Clean water beneath is then decanted while new arrival ballast water is taken on. The upper layer of the departure ballast is transferred to the slop tanks. After further settling and decanting, the next cargo is loaded on top of the remaining oil in the slop tank, hence the term load on top.

Segregated ballast tanks

New oil tankers (i.e. those for which the building contract was placed after 31 December 1975) of 70,000 tons deadweight and above, must be fitted with segregated ballast tanks large enough to provide adequate operating draught without the need to carry ballast water in cargo oil tanks.

Segregated ballast tanks (SBT) are required on all new tankers of 20,000 dwt and above (in the parent convention SBTs were only required on new tankers of 70,000 dwt and above). The Protocol also required SBTs to be protectively located - that is, they must be positioned in such a way that they will help protect the cargo tanks in the event of a collision or grounding.

Crude oil washing (COW)

Another important innovation concerned crude oil washing (COW), which had been developed by the oil industry in the 1970s and offered major benefits. Under COW, tanks are washed not with water but with crude oil - the cargo itself. COW was accepted as an alternative to SBTs on existing tankers and is an additional requirement on new tankers.

Port Reception Facilities

Parties to the MARPOL Convention, particularly port States, have an obligation to provide reception facilities for wastes generated during the normal operation of ships. Unfortunately, such facilities are still generally inadequate, and IMO has therefore developed a Plan with the aim of improving the provision and use of adequate port reception facilities, including items relating to reporting requirements; provision of information on port reception facilities; identification of any technical problems encountered during the transfer of waste between ship and shore and the standardization of garbage segregation requirements and containment identification; review of the type and amount of wastes generated on board and the type and capacity of port reception facilities; revision of the IMO Comprehensive Manual on Port Reception Facilities; and development of a Guide to Good Practice on Port Reception Facilities.

Special Areas

A new and important feature of the 1973 Convention was the concept of "special areas" which are considered to be so vulnerable to pollution by oil that oil discharges within them have been completely prohibited, with minor and well-defined exceptions. The 1973 Convention identified the Mediterranean Sea, the Black Sea, and the Baltic Sea, the Red Sea and the Gulfs area as special areas. All oil-carrying ships are required to be capable of operating the method of retaining oily wastes on board through the "load on top" system or for discharge to shore reception facilities.

2.1.2 Sewage and Garbage

Ships are not permitted to discharge sewage within four miles of the nearest land unless they have in operation an approved treatment plant. Between 4 and 12 miles from land sewage must be comminuted and disinfected before discharge.

With respect to garbage, there is a total prohibition of the disposal of plastics anywhere into the sea, and severe restrictions on discharges of other garbage from ships into coastal waters and "Special Areas".

2.1.3 Air Pollution

Annex VI to MARPOL set formal limits on sulphur oxide (SO_x) and nitrogen oxide (NO_x) emissions from ship-generated (bunkers or engine) exhausts and prohibited deliberate emissions of ozone-depleting substances.

SO_x

Sea-going ships burn extremely dirty fuels that contain on average 2.5 – 3% sulphur – almost 3,000 times the sulphur content of road diesel fuel in Europe. Since emissions are directly proportional to the sulphur content of the fuel, the simplest way of reducing them is to use fuel oil with a low sulphur content. The higher quality, low-sulphur distillate fuel has the advantage of making for smoother engine running, with less risk of operating problems and less maintenance costs. It also significantly reduces emissions of particulate matter and several other harmful substances.

In order to promote this practice, there is a current global cap of 4.5% on the sulphur content of fuel oil, and provisions allowing for special emission control areas (ECAs) to be established. In these areas, the sulphur content of fuel used onboard ships must not exceed 1.5%. Following a deal agreed in April 2008, the sulphur content of all marine fuels will be capped at 0.5% worldwide from 2020. In a first step, the global cap should be lowered to 3.5% as from 2012. The ECAs will also face a stricter limit of 1.0% in 2010 and 0.1% in 2015.

Another possible alternative option is the installation of flue gas cleaning, or scrubbers. This is a relatively new technology, and trials are ongoing.

NO_x

NO_x emission standards for new ship engines will be achieved in two steps: i) emissions will be cut by 16–22% by 2011 relative to 2000, and ii) by 80% by 2016. The latter (longer-term) limit would only apply in the specially designated ECAs. They will be met by:

- Internal Engine Modifications (IEM), Exhaust Gas Recirculation (EGR) and water injection are different techniques for preventing the formation of NO_x during combustion. The potential for emission reduction is around 30–50%, the highest for water injection.
- HAM, Humid Air Motor, prevents NO_x-formation during combustion by adding water vapour to the combustion air. The method is able to reduce NO_x by 70–85%.
- Selective Catalytic Reduction, SCR, is a system for after-treatment of exhaust gases. It can reduce emissions of NO_x by more than 90%, and operates better with low-sulphur fuel oil. There are now around 100 ships fitted with SCR – many of them are frequent callers at Swedish ports.

For existing engines, no significant reductions are expected, although it was agreed that some of the largest existing engines from the period 1990–1999 should be fitted with an emission-reducing “kit” that is expected to reduce NO_x emissions by 10–20 per cent.

Gas engines

Ship engines can also operate on natural gas (LNG) and in this way reduce SO₂ emissions to almost zero since there is no sulphur in LNG. Emissions of NO_x and PM are also significantly reduced, by 80% or more.

Shore-side electricity

While in port, ships shut off their propulsion engines, but generally use their auxiliary engines to power refrigeration, lights, pumps and other equipment. If ships connect to a shore-side power supply instead, emissions of SO₂, NO_x and particulate matter can be cut by 90% or more.

Ozone-depleting substances

The use of halogenated hydrocarbons (halons) as a fire-fighting agent has been stopped because of the damage they can cause to the ozone layer.

2.1.4 Tri-Butyl-Tins

Since the 1980's there has been a fairly widespread ban by individual countries on the use of TBT-based anti-fouling coatings on vessels less than 25 metres in length. From 2003, there has been a ban on their application under the IMO Anti-fouling Convention.

2.2 Pollution resulting from accidents

There are a variety of management measures which have been put in place to try and reduce the impacts of pollution arising from shipping accidents. These can be broadly categorised as:

1. Measures to improve the safety and security of ships i.e. to prevent accidents from happening;
2. Measures to reduce the loss of oil, in particular, into the sea, even when an accident does occur;
3. Measures to respond to accidents with a view to containing the impacts as far as possible eg.. contingency planning for oil spill response.

Examples of some of these measures are outlined below, while oil spill contingency planning is dealt with in more detail in a later session.

2.2.1 Improving the safety and security of ships

IMO's primary function is to make shipping of all types safer, including tankers and chemical carriers. The relevant measures are incorporated in the numerous safety conventions (see Annex) the most important of which is SOLAS (Safety of Life at Sea). While the main focus of these conventions is to protect the lives of seafarers – and the ships – there are obviously benefits to the marine environment as well in terms of the reduced number of accidents.

As an example, SOLAS includes fire safety provisions for all vessels. These are, however, much more stringent for tankers than ordinary dry cargo ships, since the danger of fire on board ships carrying oil and refined products is much greater. Even tanks which contain no oil are filled with flammable gas which can explode unless proper procedures are followed. The normal method is to fill these tanks with inert gas, that is, a gas which is non-explosive. This is usually done by using the gas from the ship's boiler flue: it is cleaned and then pumped into the empty tanks, or into the spaces left above the oil in loaded

tanks. An inert gas system is required on all new tankers and most existing tankers of 20,000 dwt and above.

Other safety conventions which are particularly relevant include the International Regulations for the Prevention of Collisions at Sea, 1972, which contain special provisions for ships such as tankers which, by virtue of their draught, have a reduced ability to manoeuvre: and the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, several of whose requirements are designed specifically for those working on tankers. It is important to note that the so-called "Human Element" has been a factor in a number of incidents which have led to major oil spills eg. the Exxon Valdez.

To promote effective implementation of these and other conventions, IMO has built up an effective programme of technical assistance which is designed to help Governments enforce conventions and other instruments.

On the security side, acts of piracy and armed robbery against ships have become fairly frequent in recent years, and are of tremendous concern to IMO and to shipping in general. This has led to the introduction of measures to prevent and suppress these acts – such as those aimed at improving security on ships and in port facilities, adopted in December 2002.

IMO is also implementing an anti-piracy project, a long-term project which began in 1998. Phase one consisted of a number of regional seminars and workshops attended by Government representatives from countries in piracy-infested areas of the world; while phase two consisted of a number of evaluation and assessment missions to different regions. IMO's aim has been to foster the development of regional agreements on implementation of counter piracy measures.

More recently, a programme of sub-regional meetings was initiated to promote regional action to address piracy and armed robbery against ships in the wider context of maritime security. The first of these was held in Sana'a, Yemen in April 2005 for States in the Red Sea and Gulf of Aden areas, with a follow-up held in Oman in January 2006. Further initiatives under this programme have taken place in the Caribbean, South Asia, Asia Pacific and West and Central Africa in 2006.

IMO has also issued the following circulars:

- Revised MSC/Circ.622 : Recommendations to Governments for preventing and suppressing piracy and armed robbery against ships suggests possible counter-measures that could be employed by Rescue Co-ordination Centres and security forces. Now also includes draft Regional agreement on co-operation in preventing and suppressing acts of piracy and armed robbery against ships.
- Revised MSC/Circ.623 : Guidance to shipowners and ship operators, shipmasters and crews on preventing and suppressing acts of piracy and armed robbery against ships contains comprehensive advice on measures that can be taken onboard to prevent attacks or, when they occur, to minimize the danger to the crew and ship.

2.2.2 Reducing pollution from shipwrecks

Some of the measures introduced by IMO to reduce the amount of oil spilled in the event of an accident include:

- New tankers must meet certain requirements regarding subdivision and stability, which are intended to ensure that, in any loading conditions, the ship can survive after being involved in a collision or stranding.
- Double hulls: i.e. The tanker is built with an outer and an inner hull, separated from each other by two or three metres of space which can, when required, be used for the carriage of ballast water. If the tanker is involved in a collision or runs aground, in many accidents most if not all of the damage will be absorbed by the outerhull, leaving the oil-carrying tanks themselves undamaged.
- The protective location of segregated ballast tanks, which means that the ballast tanks (which are empty on the cargo-carrying leg of the voyage) are positioned where the impact of a collision or grounding is likely to be greatest. In this way the amount of cargo spilled after such an accident will be greatly reduced. The 1983 MARPOL amendment's ban the carriage of oil in the forepeak tank - the ship's most vulnerable point in the event of a collision.

On a slightly different note, the Intervention Convention of 1969 is designed to enable Governments to take action when the threat occurs outside their territorial waters. Until the adoption of this Convention there were considerable legal difficulties involved in taking such action, since countries have always been prevented from acting against ships of other countries operating on the high seas. It was widely recognized by Governments, however, that it was essential to act as soon as possible in the event of a major accident threatening pollution, and the Convention was designed to enable them to do so.

More recently, Member States of the IMO recognized that, when a ship has suffered an incident, the best way of preventing damage or pollution from its progressive deterioration is to transfer its cargo and bunkers, and to repair the casualty. Such an operation is best carried out in a place of refuge. However, to bring such a ship into a place of refuge near a coast may endanger the coastal State, both economically and from the environmental point of view, and local authorities and populations may strongly object to the operation. Therefore, granting access to a place of refuge could involve a political decision which can only be taken on a case-by-case basis. In so doing, consideration would need to be given to balancing the interests of the affected ship with those of the environment.

In November 2003, the IMO Assembly therefore adopted:

- *Guidelines on places of refuge for ships in need of assistance* which are intended for use when a ship is in need of assistance but the safety of life is not involved. Where the safety of life is involved, the provisions of the SAR Convention should continue to be followed.
- A resolution on *Maritime Assistance Services (MAS)*, which recommends that all coastal States should establish a maritime assistance service (MAS). The principal purposes would be to receive the various reports, consultations and notifications required in a number of IMO instruments; monitoring a ship's situation if such a report indicates that an incident may give rise to a situation whereby the ship may be in need of assistance; serving as the point of contact if the ship's situation is not a distress situation but nevertheless requires exchanges of information between the ship and the coastal State, and for serving as the point of contact

between those involved in a marine salvage operation undertaken by private facilities if the coastal State considers that it should monitor all phases of the operation.

On 2 December 2008, the United Nations Security Council adopted Resolution 1846, which states that for 12 months from 2 December 2008, States and regional organizations cooperating with the Somali Transitional Federal Government (TFG) may enter Somalia's territorial waters and use "all necessary means" -- such as deploying naval vessels and military aircraft, as well as seizing and disposing of boats, vessels, arms and related equipment used for piracy -- to fight piracy and armed robbery at sea off the Somali coast, in accordance with relevant international law.

2.3 Ship Recycling

IMO's role in the recycling of ships, the terminology used to refer to ship scrapping, was first raised at the 44th MEPC session in March 2000. This led to the development of *Guidelines on Ship Recycling* which were then adopted by the 23rd Assembly in November-December 2003. These guidelines provide advice to all stakeholders in the recycling process, including administrations of ship building and maritime equipment supplying countries, flag, port and recycling States, as well as intergovernmental organizations and commercial bodies such as shipowners, ship builders, repairers and recycling yards. For example, they noted that:

- steel could be reprocessed to become, for instance, reinforcing rods for use in the construction industry or as corner castings and hinges for containers;
- Ships' generators and batteries could be reused ashore.
- Hydrocarbons on board become reclaimed oil products to be used as fuel in rolling mills or brick kilns.

However, the guidelines also recognized that, although the principle of ship recycling may be sound, the working practices and environmental standards in the yards often leave much to be desired. While ultimate responsibility for conditions in the yards has to lie with the countries in which they are situated, other stakeholders must be encouraged to contribute towards minimising potential problems in the yards.

The Guidelines on Ship Recycling also introduced the concept of a "Green Passport" for ships. It was envisaged that this document, containing an inventory of all materials used in the construction of a ship that are potentially hazardous to human health or the environment, would accompany the ship throughout its working life. Produced by the shipyard at the construction stage and passed to the purchaser of the vessel, the document would be in a format that would enable any subsequent changes in materials or equipment to be recorded. Successive owners of the ship would maintain the accuracy of the Green Passport and incorporate into it all relevant design and equipment changes, with the final owner delivering it, with the vessel, to the recycling yard.

Subsequently, at its 53rd session in July 2005, the Marine Environment Protection Committee (MEPC) agreed that the IMO should develop, as a high priority, a new instrument on recycling of ships with a view to providing legally binding and globally applicable ship recycling regulations for international shipping and for recycling facilities. The IMO Assembly later that year approved the recommendation of MEPC and requested it to develop a new instrument that would provide regulations for:

- i) the design, construction, operation and preparation of ships so as to facilitate safe and environmentally sound recycling, without compromising the safety and operational efficiency of ships;
- ii) the operation of ship recycling facilities in a safe and environmentally sound manner; and
- iii) the establishment of an appropriate enforcement mechanism for ship recycling, incorporating certification and reporting requirements.

This culminated in the adoption of the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009 (the Hong Kong Convention) at a diplomatic conference in May 2009. It addresses all the issues around ship recycling, from the presence of environmentally hazardous substances such as asbestos, heavy metals, hydrocarbons, ozone-depleting substances and others to the concerns raised about the working and environmental conditions at many of the world's ship recycling locations.

Regulations in the Convention cover: the design, construction, operation and preparation of ships so as to facilitate safe and environmentally sound recycling without compromising the safety and operational efficiency of ships; the operation of ship recycling facilities in a safe and environmentally sound manner; and the establishment of an appropriate enforcement mechanism for ship recycling, incorporating certification and reporting requirements.

- The following guidelines have been developed and adopted to assist States in the implementation of the Convention:
- 2011 Guidelines for the Development of the Inventory of Hazardous Materials, adopted by resolution MEPC.197(62);
- 2011 Guidelines for the Development of the Ship Recycling Plan, adopted by resolution MEPC.196(62);
- 2012 Guidelines for Safe and Environmentally Sound Ship Recycling, adopted by resolution MEPC.210(63); and
- 2012 Guidelines for the Authorization of Ship Recycling Facilities, adopted by resolution MEPC.211(63).
- 2012 Guidelines for the survey and certification of ships under the Hong Kong Convention, adopted by resolution MEPC.222(64); and
- 2012 Guidelines for the inspection of ships under the Hong Kong Convention, adopted by resolution MEPC.223(64).

The Convention will enter into force 24 months after the date on which 15 States, representing 40 per cent of world merchant shipping by gross tonnage, have either signed it without reservation as to ratification, acceptance or approval or have deposited instruments of ratification, acceptance, approval or accession with the Secretary-General. Furthermore, the combined maximum annual ship recycling volume of those States must, during the preceding 10 years, constitute not less than 3 per cent of their combined merchant shipping tonnage. As of July, 2012 only 5 States had ratified the Convention and it is not expected to become fully operational until between 2015 and 2020.

2.4 Invasive species

Ballast water is water (generally seawater) which is taken on board a ship when it is empty or part of its cargo has been discharged and it is on route to its next port of call. The ballast water ballast enables the ship to operate effectively and safely by keeping the ship deep enough in the water to ensure efficient propeller and rudder operation, to avoid the bow coming out of the water and to avoid stresses and strains on the hull, especially in heavy seas, which potentially can cause the ship to break up and/or sink. However, ballast water generally contains live organisms which are then transferred from the port where they were taken on board, to the area where the ballast water is discharged. Concerns over this led to the development of the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention) and related guidelines. These – and the measures relating to biofouling - will be discussed in more detail in a later session.

Biofouling is thus the accumulation of unwanted organisms on hard surfaces such as the hulls and other submerged parts of vessels (including oil rigs and barges), the shells or carapaces of other species, equipment associated with fishing, mariculture or diving, and even marine debris. Biofouling on ships has historically been known as “hull-fouling” and is of concern from two different perspectives, namely the costs of the fouling to the commercial operation of the ship itself, and the threat that it poses as a vector for the introduction of invasive alien species into new geographic areas.

The management of biofouling includes prevention measures aimed at:

- preventing settlement of fouling organisms
- preventing growth of settled organisms

However these are generally not 100% effective, so that management also necessarily includes cleaning programmes for the removal and disposal of biofouling material.

Prevention measures are based on the use of anti-fouling systems, which - because of their toxicity - are now regulated in terms of the International Convention on the Control of Harmful Anti-fouling Systems on Ships, 2001 (AFS Convention) as discussed above.

Until fairly recently, the management of biofouling as a vector for invasive alien species, was limited to codes and guidelines developed at national and regional level. However, in March, 2006, Australia presented an Information paper to the 54th meeting of the Marine Environment Protection Committee (MEPC 54) of IMO pointing out the importance of biofouling as a pathway for the introduction of marine pests in Australian waters. This led to the adoption of the Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species (the Guidelines) at MEPC 62 in July, 2011. These Guidelines will be implemented for a period – up to 5 years – during which time their effectiveness as a regulatory measure would be evaluated, following which a decision will be taken on the need for a mandatory instrument.

2.5 The role of national governments

The international nature of shipping means that the IMO and its Conventions play a leading role in the management of pollution from ships. However, national governments play a crucial role in ensuring

compliance with the provisions of these conventions – through Port State Control programmes and Flag State implementation – and by monitoring and management of ships passing through the waters under their jurisdiction. In addition, they should take responsibility for providing assistance to, overseeing, or even directly coordinating, the response to any maritime incidents.

ICZM

The protection and management of coastal areas has been the core business of the UNEP Regional Seas Programmes for the past 40 years and has therefore effectively been on the agenda in African countries since the adoption of the underlying Conventions (Barcelona (1976/1995¹³), Jeddah (1982), Abidjan (1981) and Nairobi (1985/2010¹⁴). However, ICZM *per se*¹⁵ became a priority in sub-Saharan Africa following the adoption of Agenda 21 (1992), the 1993 Arusha Declaration and the numerous initiatives which flowed out of that, including the Pan-African Conference on Sustainable Integrated Coastal Management (PACSICOM, 1998), and the Cape Town Conference on Development and Protection of the Marine and Coastal Environment in sub-Saharan Africa (1998) – and related projects (see Table 1 below).

Despite considerable progress, problems remain, and the AU's 2050 AIM Strategy includes as one of its objectives, the improvement of ICZM.

i) Criteria for achieving effective coastal management/ Vision

Legal framework:

- The 4 RS Programmes all have Protocols dealing with ICZM and LBSA, and the policies and programmes of Member States are harmonized in line with these protocols.
- All coastal states in Africa are Party to the relevant international and regional conventions and programmes and have in place appropriate national legislation providing for:
 - Integrated coastal zone management
 - Management of land-based sources of marine pollution
 - Management of land-based activities causing loss and/or degradation of biodiversity, habitats and ecosystem services
 - Spatial planning (urban and marine/maritime spatial planning)
 - Environmental Impact Assessments and similar (SEA's, environmental audits etc)

¹³ Amended version adopted.

¹⁴ Ibid.

¹⁵ Definition: "An adaptive, multi-sectoral governance approach which strives to achieve a balance between development, use and protection of coastal environments. It is based on principles such as an holistic and ecosystem-based approach, good governance, inter- and intra-generational solidarity, safeguarding the distinctiveness of coasts, precaution and prevention."

- Sustainable utilization of coastal resources.

Capacity: all coastal states have sufficient human and financial resources to effectively implement the legislation

ii) **Current Status of Legal and Institutional arrangements**

International Conventions which are directly relevant to ICZM include UNCLOS and the CBD. In the case of the latter, the Jakarta Mandate on Marine and Coastal Biological Diversity - which outlines its marine programme - identifies “integrated marine and coastal area management” as one of 5 thematic issues. Another international programme of relevance is the UNEP Global Programme of Action on Land-based Activities. Most African countries are Party to these Conventions and the coastal ones participate in the programmes through the Regional Seas Programme.

There are 4 Regional Seas Conventions which include African member states. All of these have associated technical Protocols most of which are directly relevant to ICZM. For example, there are Protocols on ICZM itself, and on Land-based Activities. A summary of information on these Conventions, Protocols and associated projects and programmes can be found in Table 1.

Implementation of ICZM activities takes place at regional, national and local levels and includes both short-term, donor-supported projects as well as national programmes. The effectiveness of implementation varies widely between both countries and regions, although it is safe to say that overall there is a shortage of both human and financial resources.

Table 1 includes information as far as possible on relevant national legislation, projects and programmes – for example, National Programmes of Action on Land-based Activities.

iii) **Governance challenges and constraints**

Regulatory framework

While the four Regional Seas Programmes around the coast of Africa cover discrete geographical areas, aspects of their mandates overlap with those of other regulatory bodies – such as the regional fisheries organisations – and there is no structured approach to co-operation amongst them. In addition, recent years have seen the emergence of new, independent structures related to the LME programmes – such as the Benguela Current Commission – which, tend to undermine the Regional Seas Conventions.

Lack of political will and support for ICZM

There is a general lack of awareness amongst policymakers of the economic value of the coast and its resources which, in Africa, has been estimated at \$ 40 billion annually (Coetzee, 2013).

Cross-sectoral coordination

There are numerous sectors – represented by a variety of organisations/departments at both regional and national levels - that have a role to play in ICZM. Achieving coordination amongst all the stakeholders is a major challenge. This is made even more difficult by the fact that there are a variety of language groups represented in each of the regions.

Rapid and unplanned growth of coastal settlements

Globally, more than two-thirds of the world's population is estimated to live at or within 200km of the coast¹⁶. Moreover, there is a clear trend in both developed and developing countries of people moving towards the coast and it is anticipated that by the year 2025, about three-quarters of the world's population will be located in the coastal zone.

The total length of Africa's coastline – including island states – is over 48,000 km (BHDP2010). The coastal population of Africa is relatively small in comparison to the global average, with about 18% of Africa's population living within 60km of the coast¹⁷. About 52 million of an estimated 204 million people live along or near the coast in West Africa where there are some of the highest coastal population densities on the continent. The areas in and around Nigeria, for example, have an estimated coastal population density of about 250-500 people per square kilometre. On the East African coast, an estimated 34 million people live at or near the coast, and urban coastal populations are growing by 5-10% in some coastal cities, enough to double in 7-14 years¹⁸.

In 1950, Alexandria and Cairo were the only African cities exceeding 1 million inhabitants. In 2005, there were 43, with an average size of 2.5 million and a combined population of more than 110 million. It is projected that in 2015, there will be 59, with an average size of 3.1 million and a combined total exceeding 168 million (UN-HABITAT).

To a large extent, the growth of these cities and other settlements are unplanned and there is insufficient infrastructure to deal with the growing demand for jobs, food and water, energy, housing, sanitation and waste management – in short, all of the requirements for sustainable urban living. Many of these challenges are likely to be exacerbated by climate change due to sea-level rise and an increase in frequency and severity of storm events ([link to section on climate change](#)).

Management of pollution from LBS

The TDA for the WIOLaB project identified the following governance issues:

- Inadequacy of legal frameworks/agreements on river-basin management (regional or national)
- Absence of regional and/or national coastal water quality standards/targets/ objectives;
- Fragmented legislation and limited cross-sectoral co-operation at national level;
- National legislation not adequately aligned with international and regional obligations;

¹⁶ Cicin-Sain & Knecht 1998; Hinrichsen 1998.

¹⁷ Based on statistics by Hatzioles et al 1996, in which it is estimated that the population of Africa's coastal states is about 75% of the African population; and about 25% of the population of these coastal states live within 60km of the coast.

¹⁸ Hinrichsen (1998:8).

- Poor enforcement of legislation in part due to a lack of capacity;
- An absence of comprehensive national marine pollution monitoring programmes with most monitoring being linked to specific projects or sites (eg. outfalls);
- Lack of registers of sources of industrial and municipal pollution;
- Lack of financing mechanisms.

It is likely that similar issues prevail across the continent.

TABLE 1: SUMMARY OF ICZM-RELATED REGULATORY MEASURES AND ACTIVITIES IN PLACE IN THE REGIONAL SEAS PROGRAMMES

Regulatory Framework	Western & Central Africa	Eastern & Southern Africa	Mediterranean	Persian Gulf
Regional Seas Convention	Abidjan Convention (1981)	Nairobi Convention (1985 and amended in 2010)	Barcelona Convention (1976 and amended in 1995)	Jeddah Convention (1982)
# of African countries in the area		10 (including France/Reunion)		
# of African countries Party to the Convention		10 (including France/Reunion)	Algeria, Tunisia, Egypt ??	Djibouti, Egypt, Somalia, Sudan
Protocol on ICZM	ICZM Protocol under development	7 th draft (2012)	Protocol adopted 2008	
Protocol on LBSA	LBSA Protocol adopted in June, 2012: entry into force?	LBSA Protocol adopted in March, 2010: entry into force?	LBS Protocol adopted in ?? : amended in 1996	
Regional standards				
National legislation: # of countries with legislation in place on:				
	ICZM	South Africa	All countries except Somalia have coastal policies & legislation in place.	
	EIA	South Africa	Kenya, South Africa	

	Spatial planning				
	Solid waste management				
	ICZM activities				
RS Work Programmes:	2015 – 2016: <u>Objectives:</u>				
Current	i) build capacity for integrated coastal & marine management; ii) promote ICM in the context of LB activities				
Past		WIOLaB, SECAM, RECOMAP			
LME Activities	CCLME, GCLME, BCC/LME	ASCLME			
National Programmes					
# of countries with NPA on LBA	South Africa	South Africa			
National Pollution Monitoring Programmes					
Marine Protected Areas					

Protection of coastal habitats and resources

The TDA for the WIOLaB project identified similar issues in relation to the physical alteration and destruction of habitats (PADH) with regards adequacy, fragmentation, alignment and enforcement of legislation, as well as capacity and financial mechanisms. Again, these issues are also likely to be applicable to the other regions.

iv) Recommendations: Strategies to strengthen coastal governance¹⁹

At the regional level, steps should be taken to try and get all countries to ratify and implement the relevant RS Convention and associated Protocols. LME Programmes should be linked to the Regional Conventions. In cases where they establish commissions, these should be established through Protocols.

Build political will and support for ICZM

- The growing focus on the development of the “Blue Economy” – including in the AU’s 2050 AIM Strategy - provides an ideal opportunity to undertake national and/or regional assessments of the potential of the coast and its resources to contribute to, for example, the coastal tourism and leisure industry, as well as its value in terms of ecosystem services such as coastal protection, waste absorption, carbon sequestration etc.

Cross-sectoral Coordination

- At national level legislation providing for ICZM should include provisions for the establishment of Coastal Coordinating Committees with representation from all relevant sectors
- An ICZM Committee (or Network – draft NC Protocol) should also be established at regional level with membership including national Focal Points as well as representation from other regional bodies (eg. regional economic and fisheries bodies).

Rapid and unplanned growth of coastal settlements

- Promote the introduction and/or implementation of Urban/Marine/Maritime Spatial Planning
- Promote use of coastal setback lines and/or similar measures
- Strengthen the requirements for EIA’s, SEA’s and other instruments aimed at ensuring that development in the coastal zone is appropriate
- Ensure that new developments take potential risks from climate change into account.

Management of pollution from LBS

¹⁹ It is noted that many of these recommendations are based on the TDA and SAP for LBSA in the Western Indian Ocean, but it is likely that they apply to all regions.

- Strict implementation of EIA's for developments in the coastal zone
- Improved implementation of laws on solid waste management
- Adoption of harmonized regional water quality standards/objectives
- Develop comprehensive national monitoring programmes to ensure compliance
- Look at financing options based on the polluter pays principle

Protection and sustainable use of coastal habitats and resources

- Identify critical habitat types/ vulnerable species and establish a network of MPA's to ensure adequate protection in line with international targets (10%?) (not sure to what extent this has been done).
- Promote non-consumptive use of marine resources through eco-tourism ventures
- Regulate consumptive use of resources
- Prohibit destructive practices such as the dynamiting of coral reefs
- Prohibit the trade in mollusk shells (check if CITES covers these?)
- Strict implementation of EIA's for developments in the coastal zone

Climate change

Oceans store most of the sun's energy, about ¼ of earth's anthropogenic surface warming is absorbed by the ocean, a carbon reservoir, thus playing a major climate change mitigation role and buying us time. Oceans also transports heat and play a major role in wind and precipitation patterns. The absorption of great amount of anthropogenic CO₂ emissions by oceans changes its chemical balance and also endangers marine and human life, the most important consequence of absorption of CO₂ emissions by the ocean is ocean acidification. Oceans are naturally alkine and atmospheric CO₂ dissolves naturally in the ocean, forming carbonic acid, which is a weak acid. The hydrogen ions released from this acid lowers the Ph. These reactions are part of a natural buffer system but the huge amount of CO₂ created by burning fossil fuels are over stretching the rate by which natural process can neutralise this acidity with devastating consequences that includes the reduction of biocalcification of shells, bones and skeletons most marine organisms such corals, seashells, crabs, crayfish, starfish and sea urchins.

Climate change impacts such as warmer water temperatures result in coral bleaching with devastating impacts on coral reefs, formed over millennia, and that provide unique habitat to support a high diversity and density of life. Coral reefs also support over a million animal plant species and have an economic value that exceeds USD 30 billion a year. Other climate change impacts includes changes in circulation and salinity that may affect the great ocean conveyer belt and the circulation of nutrients.

Ocean water expands as it heats up and additional water flows into ocean as ice melts on land, causing sea levels to rise. Sea levels will continue to rise for many centuries after global temp is stabilized since it

takes a long time for oceans and ice sheets to fully respond to a warmer climate. One of the many impacts of sea level rise is displacement of people living in or near low - lying areas, creating new legal issues. Saltwater intrusion into freshwater resources will also make certain areas uninhabitable.

Marine vegetation stores 55% of world's naturally absorbed CO₂ however marine ecosystems that bind blue carbon are being destroyed by anthropogenic factors such as aquaculture, marine and land – based pollution and coastal development. When marine ecosystems are destroyed it erodes capacity of natural ecosystems to mitigate climate change and previously stored blue carbon are released back into atmosphere. The western coast of Africa is suffering from erosion.

One of the biggest impacts of climate change will also be felt by Ports (to elaborate)

In addition to the impact of climate change a great amount of CO₂ emissions emanates from the shipping sector. Ships contribute to both GHG and ocean acidification by emitting CO₂ black carbon, and nitrogen oxides (Black carbon – commonly called “soot” – made up of fine particles released by the incomplete combustion of fuel, such as oil or coal and contributes to the warming of the atmosphere (BC is solid and warms by absorbing sunlight). CO₂ emissions from ships contribute to 3.4 % of all global emissions of CO₂ and if it was a state, it would be the 6th largest producer of CO₂. Currently emissions from ships are unregulated by the international legal framework that addresses climate change, however

Historically developing countries have contributed very little to climate change, yet they are most vulnerable to the impacts of climate change, often with limited ability to respond thereto.

Climate change also brings opportunities and can be used as a vehicle to address other national coastal development issues, to obtain technology transfer and to change the way of doing business as usual and to further strengthen and improve leadership.

Criteria for responding to climate change/ Vision

Legal framework:

- All coastal states in Africa are party to or implements the relevant international and regional programmes of Member States, including but not limited to:
 - UNFCCC,
 - Kyoto Protocol and
 - The 2015 Agreement

- Marine and Coastal issues are incorporated in regional adaptation initiatives such as:
 - Advancing Capacity for Climate Change Adaptation (ACCCA/UNITAR)
 - Climate Change Capacity Development (C3D)
 - Capacity Development for Adaptation to Climate Change and GHG Mitigation (C3D+)
 (*note: while some of these initiatives have come to an end – I was involved in them and still have good ties with the UNITAR programme)

- All coastal states in Africa that are classified as a Least Developed Country (LDC) has the capacity to
 - Address, argue and ensure that coastal issues being further exacerbated by the impacts of climate change are incorporated in the country's National Adaptation Programmes of Action (NAPAS). The NAPA process enables LDCs to identify priority activities necessary to respond to their urgent and immediate needs to adapt to climate change. It sets out those activities that if further delayed, it would increase the vulnerability and/or costs at a later stage.

Capacity development:

- All coastal states in Africa has the necessary capacity to respond to the impacts of climate change

Current Status of Legal and Institutional arrangements

The following International Conventions are relevant to Climate Change:

- United Nations Framework Convention on Climate Change
- Kyoto Protocol
- In 2015 a new legal instrument will be agreed between all countries

Regional legal and institutional arrangements:

- African Union (AU) Climate change adaptation programmes
 - African Monitoring of the Environment for Sustainable Development (AMESD)

- Multilateral Environment Agreements (MEA) Capacity Building Project for AU Member States
- The Programme of Action for the Implementation of the African Regional Strategy on Disaster Risk Reduction;
- List is ongoing

Governance challenges and constraints

Limited capacity

Not all African coastal states have the capacity to respond to climate change and require both capacity development and technological transfer to assist with both adaptation and mitigation measures.

New legal issues

New and unique issues are arising as countries are suffering from the impacts of climate change. Sea – level rise and storm surges damages coastlines and displaces thousands, resulting in an increase of internally displaced persons as well as those forced to cross borders. While it is almost impossible to draw a clear nexus between the impacts of climate change and displacement, there remains a gap in the international legal framework to address those crossing borders as a result of climate change impacts such a sea - level rise²⁰.

Representation at international negotiations

Coastal African states are often unrepresented at international negotiations, this leads to the misrepresentation of country needs.

Costs of adaptation measures and lack of resources

Coastal adaptation measures are costly to implement and it is not often realized that a delayed response comes at a much greater cost. The economic value of losing natural resources often outweighs the adaptation cost

²⁰ There is a very strong argument to be made that sea – level rise is an impact that would not have been there was it not for climate change.

Climate data and reporting /observation systems and lack of specialized knowledge

Sophisticated climate data and reporting/observation systems are necessary to correctly predict localized climate change impact and to assist with early warning systems. While international climate change observation data is freely available, localized information is crucial in national coastal planning and development. Countries also need specialized knowledge to assist with the interpretation of climate change data and info

Various other socio – economic issues

Coastal African states face an array of socio – economic issues that often take priority over the issue of climate change. In cases where the impacts of climate change are not directly felt yet it is difficult to argue that it is equally important to address future impacts as well as immediate health issues such as HIV/AIDS. Often policy makers only realize the importance of addressing climate change after storm surges plundered coastlines and lives are lost.

Lack of coordination between sectors

The impacts of climate change are cross-cutting and a holistic approach is necessary.

Lack of political will and stakeholder involvement

The buy – in off all stakeholders are necessary to ensure effective responses to climate change issues

Recommendations: Strategies to respond to climate change

- Local and traditional knowledge is very important for weather observations and should not be overlooked
- we need to keep in mind that often the challenges we talk about are “future” challenges that are uncertain - how will future uncertain challenges impact on the suggestions that we propose
- see what steps are already being taken to address climate change issues and see where there are gaps and room to implement climate related provisions (coastal planning, data sharing etc.).
- Coastal setback lines
- international measures such as: CCS, Blue Carbon, and ocean fertilization

(blue carbon: blue carbon = carbon stored & released from marine vegetation ;WG I developing methodologies for blue carbon accounting and monitoring. Policy frameworks are considered, a lot of uncertainty that needs to be considered . before current nature based frameworks can be modified to include blue carbon and before something like blue carbon trading / offsets can be considered under the UNFCCC process)

- lessons learned from the Adaptation to Climate and Coastal Change in West Africa (ACCC)
- Improve coordination and harmonization of programmes and projects between countries
- coordination mechanism among different stakeholders
- increased awareness and capacity development
- inter regional consultation

III. Maritime boundaries

Marine resources – both living and non-living – can and do make significant contributions to the GDP of coastal states. In order to lay claim to – and prevent conflict over - such resources, States need to establish jurisdiction over the areas concerned through the processes outlined in UNCLOS. This includes:

- delimiting maritime boundaries with neighbouring States; and
- delineation of the various maritime zones including internal waters, territorial seas, continental shelf and exclusive economic zones.

At present there are still a number of inter-state boundaries which have not been agreed and which are a potential source of conflict. Moreover, only 14 of the 38 coastal States of Sub-Saharan Africa have submitted claims for the extension of their continental shelves beyond 200 nm as per Article 76 (8) of UNCLOS.

The AIM Strategy talks about establishing a Combined Exclusive Maritime Zone of Africa (CEMZA) – maybe this should also be covered in this section?

i) Vision

All remaining boundary disputes resolved and Joint Development Zones agreed where appropriate.

The outer boundaries of the continental shelf agreed for all coastal States in Africa.

ii) **Current Status of Maritime Boundary Delimitation**

Boundary disputes

List of those boundaries where there are still disputes between neighbouring countries and/or provisional agreements in place (in terms of Article 74(3) for EEZ and 83(3) for continental shelves:

Examples of use of Joint Development Zones to reduce conflict

- a. Ghana/ Cote d'Ivoire – is an offshore oil deposit which straddles the boundary (although delimitation has not been finalized)
- b. Nigeria & Sao Tome & Principe: 2000 agreement on the joint exploitation of the petroleum resources and fisheries in a sector adjacent to their EEZ's (see Fig.)
- c. Tunisia and Libya: Joint exploration agreement 1982
- d. Senegal and Guinea-Bissau agreement (50% each for fisheries resources; for petroleum resources, Senegal 85%, Guinea-Bissau 15%);

Continental shelf

Table x: List of submissions regarding outer limit of continental shelf

Country	Date of submission
Mauritius & Seychelles (joint submission)	1 st December, 2008
Ghana	1 st April, 2009
South Africa	5 th May, 2009
Kenya	6 th May, 2009
Nigeria	7 th May, 2009
Cote d'Ivoire	8 th May, 2009
Namibia	12 th May, 2009
Mozambique	7 th July, 2010
Madagascar	29 th April, 2011
Tanzania	18 th January, 2012
Gabon	10 th April, 2012
Angola	6 th December, 2013
Somalia	21 st July, 2014

IV. Supporting Blue Growth in Africa

EXPANDED DEFINITION OF BLUE ECONOMY

Human interaction with our oceans needs to be redefined to ensure a relationship that is sustainable in nature. The concept of a “Blue Economy” is not one that is legally defined but rather a state of mind that requires a mindset change and should be translated into action as we increasingly recognize the interdependence of all elements in the interaction between humans, land and ocean. It is a concept that implies the sustainable use of the abundance goods and services, supplied by the ocean, as well as adaptation to and mitigation of risks or dangers that the ocean presents to prosperity and human well-being. It is paradigm that implies an integrated approach to the governance of the ocean and urban interface, one where there is an inclusive partnership between all stakeholders that internalizes the conformity of the short term needs with long term objectives of sustainability; and one that internalizes the cost and benefits of access to common goods.

As humans we stand at the centre of the Blue Economy, it is community-based and the vulnerability of coastal communities and infrastructure are internalized. It is our responsibility to ensure, for instance, the protection of the resources for artisanal fisheries, where resources are depleted, assistance should be provided to learn a new skill to sustain livelihoods. A Blue Economy is one that addresses root causes, not only symptoms. It is an economy that ensures both the provision and protection of good and services derived from the limited marine ecosystems. It is an economy that calls for systematic changes from where decisions are based purely on economics to one that includes value. A Blue Economy is an economy where we are aware of our responsibilities and make a collective effort to change the way we interact and do business with our oceans. Ultimately a Blue Economy means that we are living with the ocean and from the ocean in a sustainable way, it is the transition toward a human-ocean centered relationship where humankind coexists with the ocean and from the ocean in a sustainable way. It is also understood that the concept of a Blue Economy integrates two dimensions – that of the provision of goods and services and the protection and security of property and life.

Ultimately the Blue Economy paradigm may be explained as an integrated approach to the governance of the ocean and urban interface, revolving around the human dimension. The paradigm implies that there is an inclusive partnership between all stakeholders that internalizes the conformity of the short term needs with long-term objectives of sustainability.

VISION OF BLUE GROWTH THAT NATURALLY PROGRESSES FROM THE BLUE ECONOMY

The Blue Economy is a country’s gateway to smart, sustainable and inclusive growth and job creation through new drivers in ocean, seas and coastal engagement. Given the right strategies the Blue Economy provides the correct environment for innovation and strengthens competitiveness in

traditional and non-traditional sectors of marine and coastal activities. Unlimited opportunities for job creation are derived from new employment opportunities and are a by product of fostering new and non traditional economic and commercial activities ranging from cultivation of aquatic products to exploitation of new and renewable energy, to new and blue technologies for harvesting marine based minerals and raw materials, diversified marine and coastal activities based on a multifaceted maritime heritage, marine recreation, eco-tourism, scientific knowledge, research and education. These activities generate further downstream and upstream activities with connectivity inland through river catchment areas and deltas and further inland though improved efficiency in such sectors as trade, ports and harbours, and the generation of new skills including in areas of security, surveillance and governance. The Blue Economy serves as a vehicle to address cross cutting issues such a maritime safety and security, climate change, sustainable use of marine living resources and marine pollution.

Placing a value on natural and freely accessible goods and services is an example of an important mind shift needed from the international community. It necessitates a future economy where fishing consortiums pay rents as do land based farmers; where shipping alliances pay tolls for maritime transport along shipping lanes as do the haulage companies and truckers on land, and the extractive industries and pharmaceutical companies pay the true value for contractual obligations for their privileges and free access to resources and ocean services. Only once the true economical value of natural and freely accessible goods and services are realised will the international community be motivated to find the resources to protect the ocean and its resources.

VALUE OF MARINE ECOSYSTEM SERVICES AND THE COST OF NOT TAKING ACTION

Traditional neoclassical economics viewed the economy as a “circular economy”²¹ where land, labour and capital, factors of production, are used to produce the goods and services demanded by society. Ecological economists view the economy as an open system within the biosphere. An economy where ecosystems provide production inputs and absorbs waste products, an output of production. Raw material and waste absorption are good and services provided by the environment and should be seen as a form of capital, natural capital that has a value. Important to keep in consideration is that there are planetary boundaries and that while the economy grows the biosphere remains constant in its capacity to provide these services.²²

Our existence depends on various coastal and marine ecosystem services: Goods or provisioning services include *inter alia* fisheries, mangroves, raw materials and ornamental shells. Ecosystem services or regulating services include; coastal water quality, coastline and beach stabilisation, storm protection, fish nurseries, regulating climate and weather, carbon sequestration and storage as well as waste and

²¹ International Ocean Institute Southern Africa (IOI –SA), Ocean Governance for Africa Handbook, Module 5 p 4.

²² Ibid.

pollutant processing and absorption. Finally marine biodiversity and coastal beauty are examples of cultural services derived from coastal and marine ecosystems.

Estimating the value of ocean and coastal resources and ecosystem services commonly include valuating both direct and indirect benefits.²³ Direct benefits include, fish that are consumed, or kelp used in industrial production or fertilizer, while indirect benefits are often ecological functions that are performed by coastal ecosystems and are for example wetlands detoxifying wastewater, the land –sea interaction creating a mild climate, or the deep ocean creating plant food which is carried upwards by currents to feed fish.²⁴

In some instances natural resources may not have a high monetary value but may be of extreme importance to the survival of poor communities already more vulnerable to environmental challenges and changes. Climate Change is placing increasing pressure on coastal regions, which are already seriously affected by intensive human activity. This raises the question as to what extent these areas will retain their residential and economic value in the decades and centuries to come or whether they instead may pose a threat to the human race, one undeniable threat being that from sea level rise. Reducing vulnerabilities of people in coastal settlements must be the first priority in many countries, particularly developing countries where informal coastal settlements are often the first victims of anthropogenic and/or other hazards, such as Tsunamis. At national level the Blue Economy revolves around efficient and sustainable use of ocean and coastal services and resources that internalizes external costs together with an efficient valuing of natural non market assets and services and the access there to. This however requires a major reform of the financial architecture for a fiscal overhaul that reflects all aspects of ocean services. It also requires an inclusive stakeholder participation in collaborative governance based on linkages between ocean, coastal and urban systems that internalizes the vulnerability of communities and infrastructure. In the Blue Economy there would be a need to quantify internal benefits of different activities and the commensurate viable socioeconomic contribution to preparedness mitigation and adaptation by the nation.

Currently the benefits derived from the sustainable use of ocean services and resources do not reflect the socioeconomic dimensions of an ocean-urban nexus economy. In the absence of this concept the true value of human interaction and wellbeing, derived from and because of the ocean, is never quantified, internalized or incorporated into the fiscal and investment policies and consequently governance - whether, local, national or international.

²³ The “Total Economic Value” framework was developed once it was recognised that ecosystems had economic value and assist in determining the monetary value of natural resources.

²⁴ N1 at

The cost of not taking action in protecting coastal ecosystems is often much higher than the cost of protecting these ecosystems. In various instances once an ecosystem is destroyed the cost of finding an engineering solution to replace the function performed by the ecosystem outweighs adaptation and mitigation measures that could have been put in place.

POLICY AND MANAGEMENT SUPPORT

A large number of countries are heavily dependent on the contribution of activities in their coastal and maritime areas (shipping, tourism, fisheries, aquaculture, energy, national defence, genetic resources etc.) to their Gross Domestic Product (GDP) so it follows that all these factors should be integrated into holistic and collective governance architecture just as their value added is interconnected. The Blue Economy calls for a new type of strategy and governance since it is characterized by the integration and acknowledged interdependence of all stakeholders and actors.

The pillars of a Blue Economy strategy include:

- (I) Conformity of short-term action with long-term strategy
(Individual Layer)
- (II) Coherence of National and international measures
- (III) Compatibility of Political and economic decision - making
- (IV) Demonstrating commitments by nations and leadership
(Institutional layer)
Partnerships of private and public sectors
(Productive Layer)
- (VI) Mobilizing national and international public opinion
(Societal layer)

The blue economy is not an environment that seeks to limit growth but rather an environment that seeks for new opportunities in a sustainable manner. When applying the concept of the Blue Economy in policy planning it is important to include the following foundations in the design:

- conformity of short-term action with long-term strategy;
- coherence of national and international measures;
- compatibility between political and economic decision making;
- commitments to international and regional agreements;
- mobilisation of national and international public opinion;
- promotion of the role of private / public partnership

The following examples are strategy developments in the African continent:

SA developing Blue Economy strategy to help realize the full potential of its marine resources.

To unlock country's marine resources, the sustainable use which could make a contribution towards job creation. The White Paper on the National Environmental Management of the Ocean (Nemo) was gazetted - aims to govern activities and marine stakeholders to ensure optimal and sustainable use of the marine environment.

SA's National Development Plan also identified the ocean economy as one of the key drivers to eliminate poverty and reduce inequality by 2030.

key areas include: aquaculture, marine transport, offshore oil and gas exploration

The UN Economic Commission for Africa (ECA) and the African Climate Policy Center (ACPC) released a report, 'Climate Change in the African SIDS: The Paradox of the Small.'

The report highlights that the Blue Economy can help African small island developing States (SIDS) to achieve their development aims and tackle challenges related to economic and climate change vulnerability.

development pathways for the different Blue Economy pathways in African SIDS are highlighted - each sector's development potential differs according to ecological, geographical and political circumstances

five sectors are discussed: fisheries; aquaculture; shipping and transport; tourism; and energy.

Discusses efforts to build resilience in each of these sectors and potential ways to enhance these efforts.

The report recommends, *inter alia*:

- reducing pressure on aquatic resources by promoting sustainable coastal aquaculture;
- addressing adaptation, including in the shipping and transport sectors;
- promoting diving and maritime archeology to boost tourism; and
- exploring renewable energy options, including offshore wind energy and tidal energy.

More broadly, the report recommends: developing institutional arrangements to facilitate the pursuit of mutual goals and sharing experiences and resources across the six African SIDS; and making technologies accessible, adaptable and affordable to the needs and circumstances of African SIDS.