NATIONAL BALLAST WATER MANAGEMENT STRATEGY FOR NIGERIA

Submitted to

NIGERIAN MARITIME ADMINISTRATION AND SAFETY AGENCY

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Executive Summary

Ballast water remains the main vector for the spread of marine Invasive Alien Species (IAS). Invasive alien species in marine environment have serious economic, environmental and human health impacts and apart from climate change, land-based pollution and wildlife depletion, IAS are now recognized as one of the four greatest threats to biodiversity globally.
Ships' ballast water is therefore of particular concern, because of the large quantities of ballast water coming from different marine environments around the world being discharged at ports in Nigeria.

In order for Nigeria to manage the risk of species introductions through ballast water effectively, a supportive policy environment underpinned by scientific and technical baseline information is mandatory. The proposed Nigeria National Ballast Water Management Strategy (NBWMS) is therefore intended and planned to be an integral part of the national regulatory framework, along with relevant policies, legislation and institutional arrangements. It will contain specific programmes of work and action plans which can easily translate existing national policies or newly developed policies into effective and efficient ballast water management practices that are consistent with national as well as international obligations and legal requirements.

The International Ballast Water Convention for the Control and Management of Ships' Ballast Water and Sediments provides a critically needed set of management tools to address the issue and calls for regional cooperation and harmonization of policies to attempt solving this transboundary marine environmental problem. While Nigeria is a signatory and has acceded to the Ballast Water Convention, regrettably, ballast water management and IAS have not been covered in national legislation in Nigeria. Even though Nigeria is in the league of nations with active shipping trade and activities, Ballast Water Management unfortunately is still at its infancy in Nigeria. Nigeria falls in the category of countries that lack specific laws, policies or strategies for BWM. Nigeria is herewith drafting a National Strategy document for BWM. Hence, Nigeria intends to develop and use the NBWMS as a prerequisite for effective implementation, and shall serve as an important tool for legislative and institutional development and/or reform for matters on Ballast Water Management (BWM).

This NBWMS has been developed under the guidance of the lead Agency for BMW matters in Nigeria- the Nigerian Maritime Administration and Safety Agency- NIMASA . The general objective of the present strategy is to establish the framework for an international harmonized approach for Nigeria on ships' ballast water control and management, which is consistent with the requirements and standards of the BWM Convention. In this context the relevant activities are defined and a timeline was planned. The NBWMS is proposing legal and institutional reforms to be carried out in Nigeria. These shall be based on guidelines for legal reforms related to ballast

water management available through the GloBallast Partnerships Programme together with useful information found in the GISP Toolkit for developing legal and institutional frameworks for invasive alien species (Shine 2008).

It is planned and anticipated that all funding for BWM strategies in Nigeria (once adopted by the national administration and legally enforced) shall be provided or steps taken to be provided by the National Administration- the NIMASA through annual budgets, User Fees, Fines (as in the Polluter-pays-Principle).

This Strategy concludes with a number of Strategic Priorities and measures to commence implementation of BWM in accordance with international best practice as well as 21 Action points in a draft Implementation Action Plan/Roadmap for BWM in Nigeria up to 2015. The Plan includes proposed institutional arrangements-responsibilities, task forces etc; Information gathering processes and procedures; Communication, Training and Awareness Raising Plans; proposals on institutional and legal reforms at national level are also covered.

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CHAPTER ONE

BACKGROUND AND INTRODUCTION

1.0 PREAMBLE

Over two-thirds of the world's surface is covered by water. Open oceans, semi-enclosed or enclosed seas, coastal areas, estuaries, rivers and lakes are host to highly diverse ecosystems that span all of earth's climatologic zones. The productivity of these ecosystems has largely shaped development of human society and led to human settlement along coastal margins. Globally, the number of people living within 100 km of the coast increased from ca 2 billion in 1990 to 2.2 billion in 1995, or 39 percent of the world's population (WRI 2006). The number continues to increase.

Seas and other water bodies have for long connected human populations, serving as a route for transportation of people as well as merchandise, and today more than 90% of all worldwide trade goods are transported on the ocean (IMO 2008).

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 – including everything from food and fuel to construction materials, chemicals and household items – is carried by ships, with some 36,000 merchant ships sailing the world's oceans, with a combined tonnage of over 1 billion dead weight tonnes (dwt) (UNCTAD, 2008).

Ships are specifically designed and built to move safely through the water while carrying this cargo. But, when the ship is travelling either without cargo, or only partially laden, it *must* take additional weight on board to enable it to operate effectively and safely by, for example, keeping the ship deep enough in the water to ensure efficient propeller and rudder operation. This additional material is called **ballast.** When ships were first built years ago, they carried solid ballast, in the form of rocks, sand or metal. However, since around 1880, ships have used water as ballast principally because it is more readily available, much easier to load on and off a ship, and is therefore more efficient and economical than solid ballast. When a ship is empty of cargo, it fills with ballast water. When it loads cargo, the ballast water is discharged.

However, the emergence and continued growth of global trade, initially using wooden ships with sails, and later ships made of steel and propelled by engines, also has had side effects. As with many other aspects of human endeavour, the ever-increasing movement of ships between different parts of the world and at ever-increasing speeds has implications for the environment as well as human wellbeing. This includes the spread of species beyond their native range.

The Millennium Ecosystem Assessment (2005) noted that over the past century, the impact of invasive alien species has been particularly high on islands, and predicted that the impact of invasive alien species over the coming decades will grow in intensity especially in inland waters and coastal areas. Invasive alien species (IAS) are now recognized as one of the major direct causes of biodiversity loss, and of changes in ecosystem functioning as well as provisioning and supporting services.

1.1 THE ISSUE

While ballast water is crucial to the safe operation of ships, studies have shown that when ballast water is taken on board, the organisms living in that water are also drawn in to the ballast tanks. Depending on the duration of the voyage and other factors, many of these organisms are then able to survive the journey, and are subsequently released live into the waters of the destination port when the ballast water is discharged. Thus, ballast water serves as a vector for the transfer of species from one part of the world to another. Where this new area is outside of its natural geographic range, the species which has been transferred is commonly known as an **alien** species (alternative terms are non-native or non-indigenous).

If the environmental conditions in this new geographic area are suitable, the alien species may then not only survive, but may establish and spread, in many cases causing, or with the potential to cause, harm to the local environment, economy, or human health. Such species are generally called **invasive alien species**, but other terms used for **marine invasives** include Introduced Marine Pests (IMPs) (Australia and New Zealand), Aquatic Nuisance Species (ANS) (United States), and Harmful Aquatic Organisms and Pathogens (HAOP) (IMO Ballast Water Management Convention). The Ballast Water Management Convention defines the latter as follows: "'Harmful Aquatic Organisms and Pathogens' means aquatic organisms or pathogens which, if introduced into the sea including estuaries, or into fresh water courses, may create hazards to the environment, human health, property or resources, impair biological diversity or interfere with other legitimate uses of such areas."

Invasive alien species are now generally recognized as one of the greatest threats to biodiversity globally. They also have serious economic, environmental and health impacts and, as a result, place major constraints on development. In marine and coastal environments, invasive species have been identified as one of the four greatest threats to the world's oceans along with:

- land-based sources of marine pollution,
- over-exploitation of living marine resources,
- physical alteration/destruction of marine habitats.

Ballast water is of particular concern as a vector for the introduction of invasive alien species both because of the large quantities of ballast water being used and discharged into new environments around the world, but also because of the huge variety and numbers of species which it may transfer. It is estimated that some 3–5 billion tonnes of ballast water is transferred throughout the world each year with an individual ship

carrying anything from several hundred litres to more than 130,000 tonnes of ballast water, depending on the size and purpose of the vessel. Since just one cubic metre of ballast water may contain up to 50,000 zooplankton specimens (Locke *et al.* 1991, 1993; Gollasch 1996; Kabler 1996) and/or 10 million phytoplankton cells (Subba Rao *et al.* 1994), and the majority of marine species include a planktonic phase in their life cycle, there are literally thousands of different marine species that may be carried in ships' ballast water – basically anything that is small enough to pass through a ship's ballast water intake ports and pumps. This includes bacteria and other microbes, small invertebrates and the eggs, cysts and larvae of various species, including most fish, although not all of these will survive in the ballast tank because it is a hostile environment with considerable disturbance, lack of food and light.
The spread of IAS is a global phenomenon, and the scale of impacts can range from local to transboundary or global. The issue thus needs to be addressed through a multitude of approaches, requiring specific and targeted action at national level that is coherent and coordinated on the regional and global levels. However, it is clear that progress in addressing invasive alien species in marine and aquatic environment varies much between countries. Although there is an overall trend towards better regulatory and implementation frameworks for prevention, control and mitigation of IAS impacts both on a national and international level much remains to be done.

Closely associated with ballast water are ballast sediments. When a ship takes on ballast water it also takes on material contained in the water. In turbid or shallow waters this often includes solid material. When this material enters the ballast tank it settles to the bottom as "sediment" and provides a substrate for a variety of marine species, notably dinoflagellates. According to the Ballast Water Management Convention sediments are defined as "Matter settled out of ballast water within a ship". "Ballast water is thus recognised as one of the principal vectors of potentially invasive alien species, and is estimated to be responsible for the transfer of between 7,000 and 10,000 different species of marine microbes, plants and animals globally each day."
(Carlton, 1999)

1.2 INVASIVE ALIEN SPECIES (IAS)

Species that as a result of human activity have been moved, intentionally or unintentionally, into areas where they do not occur naturally are called "introduced species" or "alien species". There are numerous examples of intentional species introductions, including many food crops and organisms used in mariculture, such as tilapia, and some salmon and mollusc species.

While most species introductions result in no or little noticeable change in local ecosystem diversity and productivity, some introduced species may under suitable conditions become established and, in the absence of natural controls such as predators, parasites or disease, drastically change the ecosystem. Such species are called invasive alien species (IAS). Because an introduced species is unlikely to be subjected to the same natural controls that kept its population numbers in an ecological balance in its native range, it tends to increase rapidly, to the point where it

can take over their new environment, often to the detriment of both native biodiversity and human livelihoods.

Examples of IAS that have caused significant ecological and economic impact include the zebra mussel *(Dreissena polymorpha)* and the comb jellyfish *(Mnemiopsis leidyi).* The freshwater zebra mussel, native to Europe, has become a prolific invader, spreading to the US in ballast water and now found throughout the waterways of North America. Zebra mussels encrust any solid structures in the water and block water pipes, and the estimated cost of dealing with this may be as high as US$ 1 billion per decade. The North American comb jellyfish was introduced into the Black Sea through ship ballast water in the early 1980s. By the early 1990s the area's anchovy fishery had almost disappeared, and annual losses caused by drops in commercial catches of marketable fish were at least US$ 240 million. There are numerous further examples of marine invasive species that have caused fundamental impacts on biodiversity, ecosystem resources, fisheries and mariculture, human health, industrial development and infrastructure

1.2.1 INVASIVE ALIEN SPECIES DISTRIBUTION AND SPREAD

Habitats with similar conditions in different parts of the world may be populated by very different species of animals, algae and microorganisms. For example, although the depth, salinity and temperature regimes in south-eastern Australia may be similar to those along the US east coast, their native biota shares very few, if any, species.

This difference is due to the presence of "ecological barriers", including e.g. landmasses, large bodies of water of different temperature or salinity, and ocean currents. The presence of such barriers has allowed areas to evolve in isolation from each other, leading to different ecosystems and different species. While species naturally tend to spread this is a slow process in large part due to the barriers present.

However, ecological barriers are now increasingly broken by human activities, in particular transport and shipping. Organisms are transported much beyond their normal range and into new areas, where they may find suitable environmental conditions and become established. The increasing volumes of shipping as well as the increasing speed is adding to the risk that species are moved as well as the risk that they survive.

Other processes also contribute to lowering the barriers, including e.g. environmental change. For example, changing environmental conditions as a result of climate change, including warming as well as changed currents, can increase transport of species from one area to another, and increase the likelihood of survival. Further, disturbed ecosystems that are not in balance as a result of degradation or over exploitation may be more susceptible to bioinvasions.

1.2.2 CASE STUDIES OF MARINE BIO INVASION IN NIGERIA

According to Peters 2011, it is estimated that over 3000 plant and animal species are transported daily in the ballast tank of ships worldwide (Carlton 1995). The general

impact of exotic species invasion of aquatic systems include alteration in abundance, diversity, tropic pathways, and the replacement of one diverse assemblage by one or few dominant species. Introductions alter biodiversity of the impacted ecosystem through hybridisation (i.e. interbreeding), predation, competition for food/space, and habitat destruction (GESAMP, 1991). Major aquatic systems by exotic species are as follows:

a) The monotypic Indo-Pacific macrophyte **Nypa fruticans** (commonly known as ***"nipa palm")*** was first introduced to Nigerian waters at the upper Cross River, from. Singapore via ballast water in 1909. Three years later in 1912 this alien specie had spread to Oron, which located further down stream. From these two locations, nipa palm has rapidly naturalised and spread through out the Niger Delta.

   Unlike the native mangroves, nipa palm contributes very little to the energy input, nutrient cycle and productivity of the intertidal ecosystem since it hardly shed its leaves; and when it does shed its leaves, the leaves do not decay. Thus *nipa palm* contribute very little to the detritus food web.

b) The exotic intertidal seaweed, ***Ulvaria*** *oxysperma* appeared in the Bonny River in 1982/83 . It has been suspected to have come from Ballast water.

c) The large Indo-Pacific prawn, *Macrobrachium equidens*, was carried in ballast water and introduced into the Bonny estuary. This prawn has now spread widely and inhabits the high salinity zone of estuaries throughout the Niger Delta just as the Indo-Pacific eleotrid fish, *Prionobutis Koilomatodon* was introduced into Nigerian Niger Delta most probably by ships' ballast water. It was originally known in Port Harcourt area, but has been found recently in the Qua Iboe estuary.

d) Similarly, in 1981 the Indo-Pacific sea urchin, *Temnopleurus toreumaticus* suddenly appeared in the Bonny River through ballast water. It has become a pest as it takes fish baits from hooks, consumes fish caught in nets, entangles nets, and wounds the hands and foot of fishers.

e) In the 1980s **water hyacinth** *(Eichorina crassipes),* a member of the pickerelweed family *(Pontederiaceae)* was introduced into Nigerian waters most probably by ballast water from tropical South America, and have become naturalized in these Nigerian waters. Water hyacinth is one of the most productive on earth and is considered the worst aquatic plant. It forms dense mats that interfere with navigation, recreation, irrigation and power generation. These mats competitively exclude native submerged and floating leaved plants. Low oxygen conditions develop beneath water hyacinth mats and dense floating mats impede water flow and create good breeding conditions for mosquitoes. Water hyacinth is a severe environmental and economic problem in Nigeria.

1.2.2 IMPACTS OF INVASIVE ALIEN SPECIES

Impacts caused by marine invasive species are highly varied and include the following:

Environmental impacts

Environmental impacts include loss of native biodiversity due to preying on or competing with native species, decreased habitat availability for native species, smothering and overgrowth, parasites and disease, as well as hybridisation, causing genetic dilution. For example, the Mediterranean mussel *(Mytilus galloprovincialis)* is dispersed with ballast water and by fouling ship hulls, and is now well established in temperate regions around the globe. It has displaced several South African native mussel species, and appears to out-compete and hybridize with its close relatives on the US west coast.

Changes to ecosystem function

Changes to ecosystem function include changes in nutrient cycles and decreased water quality. In Africa and South East Asia there is a number of problems caused by the IAS of water hyacinth. The dense mats of these plants clog waterways with their ability to take over entire lakes and rivers. The plant causes the lowering of dissolved oxygen levels and thus reducing the amount of fish able to live in the water ways. This has an impact on the fishing and shipping industry. The water hyacinth takes up large quantities of vital nutrients from the water and inhibits the growth of native plants. When the water hyacinth dies it sinks to the bottom of the water body, thus causing the water to become eutrophic due to the release of all the nutrients taken up. The deterioration of the water way threatens clean drinking water and thus has an impact on human health.

Impacts to human health and wellbeing

Impacts to human health and wellbeing include decreased recreational opportunities, and overgrowth of aquifers and smothering of beaches, as well as parasites and disease. The spread of toxic phytoplankton and increasing occurrence of harmful algal blooms are of significant health concern. For example, on the Mexican Pacific coast outbreaks of Paralytic Shellfish Poisoning caused by the introduced dinoflagellate, *Gymnodinium catenatum,* caused over 30 deaths, with close to 500 people hospitalized. Also, cholera *(Vibrio cholera)* is known to mutate into new strains and travel widely in ship ballast water. Ballast water introduction of a virulent strain of cholera from Asia was implicated in a widespread cholera epidemic in Peru 1991, affecting thousands.

Economic impacts

Economic impacts can result form interference with biological resources that support fishing and mariculture (e.g. collapse of fish stocks), interference with fisheries (e.g. fouling of gears), disruption to tourism, damage to infrastructure (e.g. through fouling) and costs of treatment, clean up or control. Examples of economic

implications of IAS have been provided above. Another is the European green crab *(Carcinus maenas),* first transported to the US by wooden ships, inside holes in the hulls bored by shipworms. It is believed to be at least partly responsible for the destruction in the 1950s of the soft-shelled clam fisheries an 85% reduction in catches between 1938 and 1959 affected thousands of people.

Cultural impacts

Cultural impacts from IAS may arise from the demise of native species populations used for subsistence harvesting or degradation of culturally important habitats. Virtually every case where an invasive alien species impacts on a locally harvested resource also has a cultural impact, forcing an abandonment of traditional livelihoods and values.

Box 1.1 : Main obstacles to addressing IAS Worldwide

- inadequate policy and legal frameworks, at national, regional and global levels. While current trends in development of policies and enactment of laws at national and international levels are good, a lot remains to be done in including in relation to further development of strategic frameworks that incorporate all aspects of IAS as well as mainstrearning at national level;
- limitations in implementation and enforcement of existing policies and laws for reducing IAS.

  Implementation effectiveness of many international agreements varies, and national policies are not always adhered to fully;
- insufficient institutional coordination at national, regional and international levels. IAS is a problem with national, regional and global dimensions and prevention and management need coherent approaches;
- lack of understanding of the severity of the threat posed by IAS at political as well as technical

  levels, which is in part causative of policy and legal shortcomings;
- insufficient human, technical, institutional and logistical capacity for addressing IAS;
- limited public awareness of IAS, their threats and potential impact;
- insufficient financial support to programmes addressing IAS, whether through policy development, supporting enforcement and building compliance, or building capacity and awareness.

Source: ***Global Invasive Special Programme Millennium Ecosystem Assessment***

1.3 BALLAST WATER AND IAS

1.3.1 VECTORS AND PATHWAYS FOR SPREAD OF IAS

IAS can be spread in numerous ways. Some introductions are intentional, such as the release into the wild of fish to increase local catches, or plants introduced for mudflat or dune management (e.g. the common cord grass, *Spartina anglica)*. Many alien species are also introduced into an area outside its native range but in containment. This may include species for mariculture (e.g. salmon and tilapia), species kept in aquaria, and species traded as live seafood or live bait.

Unintentional introductions can be associated with many activities, including transport on fishing or diving gear, pleasure craft or other small boats, and alien pathogens in shellfish and other aquaculture introductions. However, the two main vectors for marine IAS, responsible for the majority of introductions, are hull fouling and ballast water.

Biofouling probably has been the vector for most species introductions to date. Relatively fast moving wooden ships have been in use for centuries, carrying growth

on the hulls as well as a multitude of boring organisms and stow-aways, and fouling on ships as well as yachts and smaller crafts still transport large numbers of species. However, wooden hulls have largely been replaced by metallic/steel hulls, and antifouling measures are widely used, thus limiting opportunities for spread of IAS somewhat, although the volume of traffic continues to increase. Biofouling can occur in or on vessels e.g. vessel hulls; underwater fittings such as propeller, rudder, bow thrusters; as well as damp or wet niche areas such as anchor lockers, sea-chests, bilge etc. Thus it provides a means by which both sessile and mobile organisms can translocate to new areas. It is estimated that biofouling is responsible for the introduction of over two thirds of all non-native algal species globally, about three quarters of all non-native marine invertebrates in Hawaii, and as much as four fifths of the non-native marine species in Port Phillip Bay, Australia.

Another major change in the shipping industry has provided a relatively new vector for spread. The all but complete shift to ballast water rather than solid ballast during the 1950s means that large volumes of water are carried by the world shipping fleet. It is estimated that some 3-5 billion tonnes of ballast water is transferred throughout the world each year with an individual ship carrying anything from several hundred kilograms to more than 130,000 tonnes of ballast water, depending on the size and purpose of the vessel. It has been estimated that 7,000 species are carried around the world in ballast water every day and 10 billion tonnes of ballast water are transferred globally each year. This means that we are now capable of moving more organisms around the world in the ballast water of ships in one month, than we used to in one century. Ballast water transfer associated with large ships is thus commonly believed to be the main vector for the spread of IAS today, and the main pathways for spread of IAS are thus the main shipping routes.

Box 2 : Summary of Marine IAS pathways and vectors

1.Unintentional-introductions can result from trade, travel and transport, including through:

- ballast water transfer;
- hull fouling;
- fouling of fishing gear, buoys, small crafts and boats moved between areas; and
- alien pathogens in shellfish and other aquaculture introductions.

2.Natural dispersal of organisms such as swimming or floating can also take place through man-made connections between previously separated areas, e.g. canals and water diversion schemes.

3.Intentional introductions are those where the transfer of the organisms was planned.

- some alien species are introduced into the wild, including fish species released to increase local catches and plants used for mudflat or dune stabilization; and
- some species are introduced into containment but "escape" or are discarded into the environment, e.g. through mariculture ("farming" of oysters, salmon, tilapia, etc.); Aquarium use; and Live seafood trade.

1.3.2 BALLAST WATER AS A VECTOR

Ships are specifically designed and built to move safely through the water while carrying cargo. But, when the ship is travelling either without cargo, or only partially laden, it must take additional weight on board to enable it to operate effectively and safely by, for example keeping the ship deep enough in the water to ensure efficient propeller and rudder operation. In the past many solid materials were used for ballast, including e.g. sand, soil and stones. This has been the vector for numerous species introduction, both terrestrial (e.g. seeds transported in soil) and aquatic (e.g. crustaceans or microorganisms living in/on moist solid ballast).

However, due to the shift in the mid 19th century, water is used as ballast and since the 1950s has completely replaced solid ballast in ships used to carry heavy loads. Ballast water systems are now an integral part of a ships design, and contribute to stability and balance as well as structural integrity of the hull. Ballast water is pumped into specially designed tanks distributed throughout the hull as ships are offloaded, and pumped out again on arrival to a port where cargo is to be loaded.

Water carried as ballast inevitably contains a large number of organisms of different species and in different life stages (e.g. eggs and larvae; cysts, spores or resting stages; and adults). Thus it constitutes a significant potential vector for spread of IAS. Since ballast water is usually taken up in or near ports, where productivity is often high due to hydrological conditions and there is an elevated risk of IAS presence, the risk of spread is further exacerbated. Also, as ballast water is mostly taken on board in shallow coastal areas it is often turbid, which leads to build up of sediment in dead

spaces of the ballast water tanks. This further increases the risk of transporting IAS in the form of cysts (e.g. dinoflagellates).

It is clear that many organisms that enter ballast water tanks perish - for example, organisms may sustain physical damage, and photosynthesizing species may not survive the absence of light. However, it is also clear that many organisms do survive and can upon discharge, if environmental conditions are favourable, become established and thrive. It is estimated that 10 billion tonnes of ballast water are transferred globally each year, and that 7,000 species are carried around in ballast water every day. Perhaps not surprisingly some of the most damaging and costly IAS introductions have been made through ballast water, including the introduction of the comb jellyfish to the Black Sea, and the introduction of the zebra mussel to the American Great Lakes.

1.3.3 REDUCING THE RISK OF SPREADING IAS THROUGH BALLAST WATER

Ballast water is increasingly recognized for its role in species translocation and as a potential vector for the spread of IAS, and consequently considerable effort has gone into identifying means to reduce the risks. Several strategies have been developed, often including one or several of the following complementary methods:

- minimizing uptake of organisms into ballast water tanks. Avoiding ballast water uptake in shallow and turbid areas, e.g. where propellers can stir up sediment, and avoiding uptake at night when many organisms migrate vertically to feed, reduces the number of organisms that enter ballast water tanks;
- removing ballast sediment. Routine cleaning of ballast water tanks and removal of sediment in mid-ocean or at specific facilities provided in port reduces the number of organisms that are transported;
- avoiding unnecessary discharge of ballast water. Where cargo handling demands-uptake and discharge of ballast water within a port, water taken up in another area should not be discharged if avoidable;
- ballast water exchange. Ballast water can be exchanged between ports, mid-ocean and in deep water, in order to reduce the risk of organisms carried in the water finding a suitable environment on discharge;
- treatment of ballast water. Several methodologies that seek to remove or render harmless organisms in ballast water while in tanks and on ships are in development or being piloted. This includes mechanical treatment (e.g. filter or cyclonic separation), physical treatment (e.g. ultraviolet, ultrasound or heat treatment), chemical treatment (e.g. the use of disinfectants or biocides), biological treatment, or a combination of these;
- discharge to reception facilities. Discharge of ballast water to reception facilities prevents organisms transported in ballast water from release into the wild.

Minimizing the risk of IAS introductions through ballast water requires a combination of multiple approaches and comprehensive and well-designed strategies. This includes operational procedures for ships and ports, monitoring, inspection and

certification, training and education as well as clear roles, responsibilities and mandates. Thus there is a need for specific policies, strategies, legal frameworks and institutional arrangements that are appropriate and coherent on a national as well as international level to regulate and guide.

1.4 INTERNATIONAL RESPONSE STRATEGY AND THE IMO BALLAST WATER MANAGEMENT CONVENTION

Growing recognition of the impact of invasive species generally has seen a widespread response to the issue in the form of legal instruments, as well as programmes aimed at developing practical, technical solutions. The **Convention on Biological Diversity** (CBD) (1992), for example, provides a comprehensive basis for measures to protect all components of biodiversity against invasive alien species. Moreover, in 1995, Contracting Parties to the CBD adopted the "Jakarta Mandate on Marine and Coastal Biological Diversity", which included alien species as a thematic issue. The goal of the programme of work under the Jakarta Mandate is: "to prevent the introduction of invasive alien species into the marine and coastal environment, and to eradicate to the extent possible those invasive alien species that have already been introduced." This is being implemented through the UNEP Regional Seas Programme. Initiatives more specific to ballast water have been on the agenda of a wide range of international organizations for the last 30 years. Today, a very wide range of key stakeholders, including shipping, ports, environmental groups, tourism bodies, public health organizations, seafood producers, etc. are working on various aspects of the problem both individually, within their own countries and regions and in international forums. At the forefront of the international initiatives is the **International Maritime Organization (IMO)** – the specialized agency of the United Nations responsible for the international regulation of ships' safety and security as well as for the prevention of marine pollution from ships.
IMO has been working through its Member States to tackle the problem of ballast water since 1973 when, at the conference to adopt the MARPOL Convention, the ballast water problem was raised. The conference adopted a Resolution which noted that "ballast water taken in waters which may contain bacteria of epidemic diseases, may, when discharged, cause a danger of spreading of the epidemic diseases to other countries", and requested the IMO and the World Health Organization (WHO) to "initiate studies on that problem on the basis of any evidence and proposals which may be submitted by governments". IMO then established a Ballast Water Working Group under the Marine Environment Protection Committee (MEPC) and has been actively engaged in seeking a solution to the ballast water problem.

Activities of the MEPC have included:
• the development of a preliminary set of Guidelines in 1991 – subsequently replaced in 1997 by an updated version: the "Guidelines for control and management of ships' ballast water to minimize the transfer of harmful aquatic organisms and pathogens" (Assembly Resolution A.868(20));
0• the development of an international legal instrument – the **International Convention for the Control and Management of Ships' Ballast Water and**

Sediments – which was adopted by consensus at a Diplomatic Conference at IMO Headquarters in London on 13 February 2004;

- the development of guidelines for the implementation of the Convention;
- since March 2000, implementation of the GloBallast Programme, a GEF-UNDP – IMO programme providing technical assistance in this area.

1.4.1 INTERNATIONAL GUIDELINES ON BWM RELEVANT TO NIGERIA

a) International/Multilateral Agreements, Protocols And Codes Related To IAS

There are many international legal and policy instruments with relevance to IAS, reflecting the multifaceted impacts and implications of their spread. While- some are very specific to the issue, such as the International Convention for the Control and Management of Ships' Ballast Water and Sediments, others are more general.

For example, the Convention on Biological Diversity, which sets the overall framework for conservation of biological diversity, sustainable use of its components, and fair and equitable sharing of the benefits from the use of genetic resources, calls in Article 8h on parties to prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species. Several Plans of Work under the CBD specifically mention invasive species. Others yet again, notably conventions on protection of specific species or habitats, recognize the threat posed by IAS to those species and habitats. In 1995, the Contracting Parties to the CBD adopted the *Jakarta Mandate on Marine and Coastal Biological Diversity*, which included IAS as a thematic issue with a goal "to prevent the introduction of invasive alien species into the marine and coastal environment, and to eradicate to the extent possible those alien species that have already been introduced."

The United Nations Convention on the Law of the Seas (UNCLOS) it defines the rights and responsibilities of nations in their use of the world's oceans, establishing guidelines for businesses, the environment, and the management of marine natural resources. UNCLOS decrees that "States shall take all measures necessary to prevent, reduce and control pollution of the marine environment resulting from the use of technologies under their jurisdiction or control, or the intentional or accidental introduction of species, alien or new, to a particular part of the marine environment, which may cause significant and harmful changes thereto". Further, as there are many potential health aspects of species introductions, especially from human pathogens and those that cause poisonings, international health regulations and regulations on trade and transport also apply.

International agreements related to IAS and relevant to Nigeria are summarized in the table below.

Box 3: Summary of international agreements relevant to IAS

Agreements, legal obligations, codes	
International Plant Protection Convention	1951
Convention on the Facilitation of International Maritime Traffic (FAL) as amended	1965
International Health Regulations (IHR) and plant and animal health agreements	1969
The Ramsar Convention on Wetlands	1971 (1999)
International Convention for the Prevention of Pollution from Ships (MARPOL 73/78)	1973/78
Convention on International Trade in Endangered Species	1973
International Convention for Safety of Life at Sea (SOLAS) as amended including the ISM Code	1974
International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW Convention) and the Seafarer's Training, Certification and Watchkeeping Code (STCW Code)	1978/95/97
Convention on the Conservation of Migratory Species United Nations	1979
Convention on the Law of the Sea	1982
Protocol on Environmental Protection to the Antarctic Treaty	1991
Convention on Biological Diversity	1992
The Rio Declaration and Agenda 21	1992
General Agreement on Trade and Tariffs and related Agreements	1994
The ICES Code of Practice on the Introduction and Transfer of Marine Organisms	1994
World Trade Organisation Agreements	1994
Convention on International Civil Aviation	1994(2001)
FAO Code of Conduct for Responsible Fisheries and subsequent Technical Guidelines	1995
Guidelines for the control and management of ships' ballast water	1997
Cartagena Protocol on Biosafety	2000
International Convention on the Control of Harmful Anti-fouling Systems on Ships (Anti-Fouling Convention)	2001
International Convention for the Control and Management of Ships' Ballast Water and Sediments	2004

It is pertinent that Nigeria is either a signatory or has acceded to all the international agreements above.

b) Regional IAS agreements and strategies

Recognizing that addressing IAS requires coordinated responses between nations and especially between nations closely connected geographically and/or through trade and travel, regional IAS strategies and plans have also been developed. Under the GloBallast Partnerships Programme, Regional Strategies and Action Plans for BWM are being developed in all affiliated regions, through the establishment of Regional Task Forces. To ensure a regional harmonization, it will be important to take this Regional Strategy into account when developing the National BWM Strategy.

The relevant subsisting Regional cooperation programme is the GEF-funded, UNIDO implemented Guinea Current Large Marine Ecosystem Project involving 16 countries bordering the Gulf of Guinea including Nigeria. And Angola, Benin, Cameroon, Cote d'Ivoire, Democratic Republic of the Congo,Equatorial Guinea, Guinea Bissau, Ghana, Liberia, Sao Tome and Principe, Sierra Leone, Togo. The project has recently transformed into a Regional Commission through a unanimous decision of the member-states. The Programme has successfully undertaken a Trans Diagnostic Analysis (TDA) of the issues involved in combating degradation of Living resources in the Gulf and has also adopted a Strategic Action Plan for the Gulf.

1.4.2 THE IMO BALLAST WATER MANAGEMENT CONVENTION

The International Convention for the Control and Management of Ships' Ballast Water & Sediments was adopted by consensus in London on Friday 13 February 2004. The Convention was to enter into force 12 months after ratification by 30 States, representing 35 per cent of world merchant shipping tonnage. (As of January 2010 there were 21 countries that have ratified the convention: (Argentina, Australia, Barbados, Brazil, Egypt, Finland Kenya, Kiribati, Maldives, Marshall Islands, Netherlands, Nigeria, Norway, Republic of Korea, Saint Kitts and Nevis, Spain, Sweden, Syrian Arab Republic, Tuvalu)
The convention includes the following main provisions (**from GloBallast website**):

General Obligations:
Under Article 2 General Obligations, Parties undertake to give full and complete effect to the provisions of the Convention and the Annex in order to prevent, minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments.
Parties are given the right to take, individually or jointly with other Parties, more stringent measures with respect to the prevention, reduction or elimination of the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments, consistent with international law. Parties should ensure that ballast water management practices do not cause greater harm than they prevent to their environment, human health, property or resources, or those of other States.
Reception facilities
Under Article 5 Sediment Reception Facilities, Parties undertake to ensure that ports and terminals where cleaning or repair of ballast tanks occurs, have adequate reception facilities for the reception of sediments.

Research and monitoring
Article 6, Scientific and Technical Research and Monitoring, calls for Parties individually or jointly, to promote and facilitate scientific and technical research on ballast water management; and monitor the effects of ballast water management in waters under their jurisdiction.

Survey, certification and inspection
Ships are required to be surveyed and certified (Article 7 Survey and certification) and may be inspected by port State control officers (Article 9 Inspection of Ships) who can verify that the ship has a valid certificate; inspect the Ballast Water Record Book; and/or sample the ballast water. If there are concerns, then a detailed inspection may be carried out and "the Party carrying out the inspection shall take such steps as will ensure that the ship shall not discharge Ballast Water until it can do so without presenting a threat of harm to the environment, human health, property or resources." All possible efforts shall be made to avoid a ship being unduly detained or delayed (Article 12 Undue Delay to Ships).

Technical Assistance

Under Article 13 Technical Assistance, Co-operation and Regional Co-operation, Parties undertake, directly or through the Organization and other international bodies, as appropriate, in respect of the control and management of ships' ballast water and sediments, to provide support for those Parties which request technical assistance to train personnel; to ensure the availability of relevant technology, equipment and facilities; to initiate joint research and development programmes; and to undertake other action aimed at the effective implementation of this Convention and of guidance developed by the Organization related thereto.

Annex - Section A General Provisions

This includes definitions, application and exemptions. Under Regulation A-2 General Applicability: "Except where expressly provided otherwise, the discharge of Ballast Water shall only be conducted through Ballast Water Management, in accordance with the provisions of this Annex."

Annex - Section B Management and Control Requirements for Ships

Ships are required to have on board and implement a Ballast Water Management Plan approved by the Administration (Regulation B-1). The Ballast Water Management Plan is specific to each ship and includes a detailed description of the actions to be taken to implement the Ballast Water Management requirements and supplemental Ballast Water Management practices.

Ships must have a Ballast Water Record Book (Regulation B-2) to record when ballast water is taken on board; circulated or treated for Ballast Water Management purposes; and discharged into the sea. It should also record when Ballast Water is discharged to a reception facility and accidental or other exceptional discharges of Ballast Water. The specific requirements for ballast water management are contained in regulation B-3 Ballast Water Management for Ships are classified as in Table 1 below:

Before 2009	<1500 or >5000	Must at least meet Exchange Standard From 2016, must meet Performance Standard
Before 2009	1500-1500	Must at least meet Exchange Standard From 2014, must meet Performance Standard
In/after 2009*	<5000	Must meet Performance Standard
In/after 2009 but before 2012	≥5000	Must at least meet Exchange Standard From 2016, must meet Performance Standard
In/after 2012	≥5000	Must meet Performance Standard

** Note that as outlined in IMO Assembly Resolution A. 7005(25), the ships constructed in or after 2009 will not have to comply with Regulation 0-2 of the Convention until its second annual survey, but no later than 37 December 2077. This provision was introduced to ensure that a sufficient supply of treatment technologies would be available before enforcing the Convention in full.*

Other methods of ballast water management may also be accepted as alternatives to the ballast water exchange standard and ballast water performance standard, provided that such methods ensure at least the same level of protection to the environment, human health, property or resources, and are approved in principle by IMO's Marine Environment Protection Committee (MPEC).

Under Regulation B-4 Ballast Water Exchange, all ships using ballast water exchange should, whenever possible, conduct ballast water exchange at least 200 nautical miles from the nearest land and in water at least 200 metres in depth, taking into account Guidelines developed by IMO. In cases where the ship is unable to conduct ballast water exchange as above, this should be as far from the nearest land as possible, and in all cases at least 50 nautical miles from the nearest land and in water at least 200 metres in depth.

When these requirements cannot be met areas may be designated where ships can conduct ballast water exchange. All ships shall remove and dispose of sediments from spaces designated to carry ballast water in accordance with the provisions of the ships' ballast water management plan (Regulation B-4).

Annex – Section C Additional measures

A Party, individually or jointly with other Parties, may impose on ships additional measures to prevent, reduce, or eliminate the transfer of Harmful Aquatic Organisms and Pathogens through ships' Ballast Water and Sediments.

In these cases, the Party or Parties should consult with adjoining or nearby States that may be affected by such standards or requirements and should communicate their intention to establish additional measure(s) to the Organization at least 6 months, except in emergency or epidemic situations, prior to the projected date of implementation of the measure(s). When appropriate, Parties will have to obtain the approval of IMO.

Annex - Section D Standards for Ballast Water Management

There is a ballast water exchange standard and a ballast water performance standard. Ballast water exchange could be used to meet the performance standard:

Regulation D-I Ballast Water Exchange Standard - Ships performing Ballast Water exchange shall do so with an efficiency of 95 per cent volumetric exchange of Ballast Water. For ships exchanging ballast water by the pumping-through method, pumping through three times the volume of each ballast water tank shall be considered to meet the standard described. Pumping through less than three times the volume may be accepted provided the ship can demonstrate that at least 95 percent volumetric exchange is met.

Regulation D-2 Ballast Water Performance Standard - Ships conducting ballast water management shall discharge less than 10 viable organisms per cubic metre greater than or equal to 50 micrometers in minimum dimension and less than 10 viable organisms per milliliter less than 50 micro metres in minimum dimension and greater than or equal to 10 micrometers in minimum dimension; and discharge of the indicator microbes shall not exceed the specified concentrations.
The indicator microbes, as a human health standard, include, but are not be limited to:

- toxicogenic *Vibrio cholerae* (01 and 0139) with less than 1 colony forming unit (cfu) per 100 milliliters or less than 1 cfu per 1 gram (wet weight) zooplankton samples;
- *escherichia coli,* less than 250 cfu per 100 milliliters;
- intestinal *Enterococci,* less than 100 cfu per 100 milliliters.

Ballast Water Management systems must be approved in accordance with IMO Guidelines. For further information, see IMO and GloBallast websites. These include systems which make use of chemicals or biocides; make use of organisms or biological mechanisms; or which alter the chemical or physical characteristics of the Ballast Water.

Prototype technologies

Regulation D-4 covers Prototype Ballast Water Treatment Technologies. It allows for ships participating in a programme approved by the Administration to test and evaluate promising Ballast Water treatment technologies to have a leeway of five years before having to comply with the requirements.

Review of standards

Under Regulation D-5 Review of Standards by the Organization, IMO is required to review the Ballast Water Performance Standard, taking into account a number of criteria including safety considerations; environmental acceptability, i.e., not causing more or greater environmental impacts than it solves; practicability, i.e., compatibility with ship design and operations; cost effectiveness; and biological effectiveness in terms of removing, or otherwise rendering inactive harmful aquatic organisms and pathogens in ballast water. The review should include a determination of whether appropriate technologies are available to achieve the standard, an assessment of the above mentioned criteria, and, an assessment of the socioeconomic effect(s) specifically in relation to the developmental needs of developing countries, particularly small island developing States.

Annex - Section E Survey and Certification Requirements for Ballast Water Management

This section gives requirements for initial renewal, annual, intermediate and renewal surveys and certification requirements. Appendices give the form for Ballast Water Management Certificate and the form of Ballast Water Record Book.

1.4.4 IMO BALLAST WATER MANAGEMENT GUIDELINES

In relation to the BWM Convention, a set of 14 guidelines have been developed through the IMO Marine Environment Protection Committee (MEPC), with another two guidelines awaiting finalization.

The objective of the guidelines is to assist governments and other authorities, ship masters, operators and owners, and port authorities in minimizing the risk of introducing harmful aquatic organisms and pathogens from ship's ballast water and associated sediments while protecting ships' safety. The guidelines are listed below:

I. Guidelines for sediments reception facilities (G1)
II. Guidelines for Ballast Water Sampling (G2)
III. Guidelines for BWM equivalent compliance (G3) Guidelines for BWM and Development of BWM Plans (G4) Guidelines for Ballast Water reception facilities (G5) Guidelines for Ballast Water Exchange (G6)
IV. Guidelines for Risk Assessment under Regulation A-4 (G 7) Guidelines for approval of BWM Systems (G8)
V. Guidelines for approval of BWM systems that make use of active substances (G9)
VI. Guidelines for approval and oversight of prototype ballast water treatment technology programmes (G 10) Guidelines for Ballast Water Exchange Design and Construction Standards (G 11)
VII. Guidelines for sediment control on ships (G 12)
VIII. Guidelines for additional measures including emergency situations (G 13) Guidelines on designation of areas for ballast water exchange (G 14) Survey Guidelines for the purpose of BWM Convention
IX. Guidelines on Port State Control under the 2004 BWM Convention

CHAPTER TWO

BALLAST WATER PROBLEM IN NIGERIA

2.0 BACKGROUND

The status of the Ballast Water problem in Nigeria has been fully covered in the Nigerian Ballast Water Status Assessment by A.C.C. Peters (2010).

Ships carry clean sea water in special separated tanks which is called ballast water in order to enhance their equilibrium and stability. Ships usually carry ballast water in empty cargo navigations. The amount of the ballast water is approximately %30-35 of the ship's deadweight tonnage. By this way, ships carry millions of different kind of species and microorganisms from one ecosystem to another. This species can be reproduce without control and invade the habitats irreversibly.

Ballast water is one of the most important vectors that contribute the invasion of aquatic organisms. It is known that the 80% of the international trade is made with ships. It is estimated that approximately 7 billion tons of sea water is transporting internationally every year. This means more than 7000 species is transporting with ships into their ballast water tanks every day between different ports.

The effects of invasive species to marine environment is more acute when compared to oil pollution, and can be visible. But the effects of the oil pollution decreases with time. Nevertheless when we consider an invasion, the first impact is very low. After a period of time the effect on the habitat will increases irreversibly and the results will be devastating.

Invasive alien species have serious economic, environmental and human health impacts and are now recognized as one of the greatest threats to biodiversity globally. In marine and coastal
environments, invasive species have been identified as one of the four greatest threats to the world's oceans.

INSERT CONCLUSIONS OF PETERS REPORT HERE

The Gulf of Guinea and particularly the Nigerian coasts constitute sensitive sea areas because of the intensive oil and gas exploration and exploitation and the attendant extensive maritime traffic for the oil and gas export. According to Peters (2010), the effects of marine bioinvasions on the ecosystem of the Gulf include alterations of the aquatic biodiversity, trophic pathways and even replacement of diverse assemblage of dominant species. Also in the Gulf of Guinea as on Nigeria coasts, six major invasions by exotic species were identified with strong recommendations for concerted action(s) to reverse the trend.

2.1 PROBLEM OF LACK OF NATIONAL BALLAST WATER LEGISLATION AND POLICIES

Although many countries as well as local port authorities already have specific requirements regarding ballast water management for protection and maintenance of native ecosystems, especially as part of their commitments to global conventions. Examples include Australia USA and New Zealand.

However, in spite of a recent increase in many member States of national legislative framework related to IAS, most countries still lack specific laws, policies or strategies for ballast water regulation and management. **Even though Nigeria is in the league of nations with active shipping trade and activities, and has acceded to the BWM Convention, Ballast Water Management unfortunately is still at its infancy in Nigeria. Nigeria falls in the category of countries that lack specific laws, policies or strategies for BWM.**

The International Association of Independent Tanker Owners (INTERANKO) has worked with the International Chamber of Shipping to gather information on countries with known ballast water reporting and management requirements. No information on BWM in Nigeria is in this database. They have kept a database since 1990 that records 17 places as having "quarantine requirements for ballast water management". These are Argentina, Australia, Brazil, Canada, Chile, Israel, New Zealand, Orkney Islands (UK), USA, California, Port of Oakland (USA), the Great Lakes (USA) and the Port of Vancouver (Canada). These guidelines seek to address this gap.

Steps have commenced in Nigeria towards implementing the requirements of the BW Convention. A National Task Force (NTF) has been established with Standing Committees on different aspects of BWM. This survey and the development of Nigeria's strategy for BWM are steps towards taking action to stop impacts of Ballast water in the Nigerian coasts. The status report and the strategy aim to define the risks of the international maritime traffic and the effect of the ballast water carried by ships entering Nigerian waters.. Also the measures needed to be taken for decreasing these risks are to be defined. In order to minimize the risks of the aquatic organisms and pathogens, an Action Plan is to be delineated within the relevant ballast water management measures with its guidelines.

With the establishment of the National Task Force (NTF), this Strategy document defines the responsibilities of Nigeria after signing the Ballast Water Convention. This strategy document defines the objectives of Nigeria's BWM Action Plan and the activities which will be carried out towards achieving these objectives..

In this Strategy document also the relevant activities for building up the management infrastructure is defined. Nigeria is a leading partnership country in the Gulf of Guinea on the Globallast Partnership Project initiated by IMO.

2.2 OBLIGATIONS FOR NIGERIA

INTERNATIONAL SCALE

Nigeria amongst other IMO Member-country has ratified the Ballast Water Convention since ….. This Convention is prepared in order to find a global solution to invasive species carried in ballast water. In this respect, the convention defines the responsibilities of port states, flag states and shipping industry. Also rules for control and management of ballast water and sediments in Nigeria are defined.

The main aim of the convention is to decrease and finally prevent the transportation of invasive species to other marine habitats. Towards executing this aim, the Convention defines two main methods viz:

- ballast water exchange and
- ballast water treatment.

The responsibilities for BWM in any nation as required by the Convention rests on three main organs. These are responsibilities of

- ships,
- maritime authority and
- port authority.

Tables 1-3 delineate the responsibilities and obligations of the respective organs.

TABLE 2: THE OBLIGATIONS FOR ALL SHIPS

All ships in Nigerian waters have an obligation to provide:
• **Ballast water management certificate** • **Ballast water management plan** • **Define a responsible personnel on board responsible for ballast water management** • **Ballast water record book** • **Make exchange operations in the transition period of the convention and/or install an approved treatment facility on board and treat the ballast water** • **Deliver sediments to the approved reception facilities** • **Reporting for the ballast operations with ballast water reporting form**

TABLE 3: THE OBLIGATIONS FOR MARITIME AUTHORITIES

NIMASA and any other designated body in Nigeria have the following responsibilities under the Convention:
• **Define the BWM strategy and prepare an action plan** • **Prepare the national legislation** • **Issue ballast water certificates to ships** • **Give type approvals to ballast water treatment facilities**

- **Determine the exemptions for applications**
- **Coordinate the port biological surveys**
- **Promote extant scientific studies as necessary**
- **Initiate and coordinate regional arrangements for BWM on behalf of Nigeria**
- **Define alternative ballast water exchange areas**
- **Define applications for the ships that is not in the scope of the convention**

TABLE 4: THE RESPONSIBILTIES FOR PORT AUTHORITIES
NIMASA, the NPA and any other designated body in Nigeria have the following responsibilities under the Convention:

- **Provide information on shipping patterns, traffic volumes and trends including goods transported and routes and ports used**
- **Provide on a regular basis information on ports capacities, including capacity to handle different ship types, especially ballast water operations**
- **Port State Controls**
- **Ballast water sampling**
- **Compliance and enforcement**

REGIONAL SCALE

Nigeria has the longest coastline amongst the countries in West and Central African Region and therefore has a leading role in the sub-region in ensuring cleaner seas and prevention of pollution of the seas from ballast water amongst others. Nigeria is a member of ECOWAS and other regional bodies and participates in regional partnerships for sustainable use of the marine resources and protection of the marine environment such as the Abidjan Convention, ODINAFRICA, the 16-country GEF/UNIDO GCLME Project etc. Within a module of the GCLME Project, work started towards the development of regional strategy documents for BWM. With the planned transition of the GEF/UNIDO Project into the GCLME Commission, a mechanism is already set to catalyse a broad regional arrangement for BMW in West and Central Africa and the consequent harmonization of this national strategy document as well as those of other countries into regional strategy documents. Nigeria provides leadership in the activities of the subregional bodies.

Ballast water management is not a system which can be implemented only on national basis. It has to be harmonized with the regional and international systems. The independent national implementation of a country could be harmful to the other. Regional cooperation in BWM cannot be overemphasized as a *sine qua non*. One good example to illustrate this is the scenario in the Turkish Straits in the Mediterranean Sea where the Russian and the Ukranian authorities accept only ships which exchange their ballast water before entering their port. But
navigation pattern on the Black Sea is not enough to finalize the exchange operations.

The ships therefore start to exchange their ballast water on Aegean Sea and go ahead to these operations on Marmara Sea. These areas are not suitable for exchange operations with respect to the convention standards. But there were no rules or laws put in force in this area which prohibited the exchange operations. Hence a strong regional cooperation in BWM is strongly recommended.

NATIONAL SCALE

Nigeria, as a major oil and gas exporting country, faces a great risk of the bioinvasions with the increasing maritime traffic. Conscious of the threat, Nigeria has commenced in earnest, arrangements to implement the Ballast Water Management Convention locally. While Nigeria is a signatory to the Convention and has ratified the convention, the country is yet to domesticate the Convention and promulgate appropriate legislation and guidelines for BWM.

The domestication and passing of national legislations are planned to be implemented as a major component of the National Strategy.

CHAPTER THREE

SCOPE, PURPOSE AND OBJECTIVES OF THE STRATEGY

3.0 SCOPE OF THE STRATEGY

1. Geographical scope

The Nigerian coastal and marine area is the socio-economic nerve center for Nigeria. The area is the home of Nigeria's main source of foreign exchange in the form of oil and gas. The coastal area also harbours industrial infrastructures worth billions of dollars, large human population, very fragile ecosystems like wetlands, mangroves, barrier and lagoon systems, nonfuel minerals, vast variety of fisheries, fauna and floral resources.

The Nigerian coastal and marine environment bordered by about 853km stretch of coastline is composed of:

Implementation of the BWM in Nigeria shall cover monitoring and enforcement across the 853 km long coastline of Nigeria. The geographical scope of the Strategy will cover all the operational ports in Nigeria- Lagos, Koko, Warri, Brass, Port Harcourt, Onne, Bonny, and Calabar etc. All the scientific and monitoring studies will cover the broad geographical area of Nigeria's coastline and Nigeria's territorial waters.

Figure 1.. Map of Nigeria showing port-cities both along the coast

2. Technical scope

The Technical scope of the BWM Strategy shall include strategies for :

- Administrative studies
- Capacity building studies
- Education activities
- Awareness Raising
- Scientific research and Studies

3.1 PURPOSE OF THE STRATEGY

Ballast water remains the main vector for the spread of marine IAS. In order for Nigeria to manage the risk of species introductions through ballast water effectively, a supportive policy environment underpinned by scientific and technical baseline information is mandatory. **The proposed Nigeria National Ballast Water Management Strategy (NBWMS) is intended and planned to be an integral part of the national regulatory framework, along with relevant policies, legislation and institutional arrangements. It will contain specific programmes of work and action plans which can easily translate existing national policies or newly developed policies into effective and efficient ballast water management practices that are consistent with national as well as international obligations and legal requirements.**

Hence, Nigeria intends to use the NBWMS as a prerequisite for effective implementation, and shall serve as an important tool for legislative and institutional development and/or reform for matters on BWM.

It needs to be noted that ballast water management and IAS are not comprehensively or explicitly covered in any existing national legislation in Nigeria. To further complicate the issue, institutional mandates and responsibilities in Nigeria as they relate to ballast water management and IAS presently in Nigeria are often not clear.

This NBWMS is therefore proposing legal and institutional reforms to be carried out in Nigeria. These shall be based on guidelines for legal reform related to ballast water management available through the GloBallast Partnerships Programme together with useful information found in the GISP Toolkit for developing legal and institutional frameworks for invasive alien species (Shine 2008). While international policies and laws exist (as synthesized above), these are by their nature often generic, in the sense that they are designed to apply as broadly as possible. They thus need to be further operationalized through national means, including by giving due consideration to a number of local, national and regional issues, whether environmental, legal, institutional or otherwise.

The purpose of this strategy therefore is essentially to plan for the future by establishing a work plan in order to minimize the harmful effects of alien species carried in ballast water to the marine environment, economical activities and public health. Also it is aimed to establish a system in order to monitor the implementation of this strategy and make revisions on the future plans.

3.2 OBJECTIVES OF THE STRATEGY

The objectives of the Strategy include the following:

- Establish a ballast water management system in line with the International

Ballast Water Management Convention

- Establish capacity building activities for NIMASA as the leading agency in order to enable the Agency to effectively undertake:
    - o port state controls,
    - o certification,
    - o type approvals,
    - o biological port baseline surveys,
    - o coordination with universities and research centers,
    - o supporting scientific studies
    - o revision of the knowledge on ballast water management

- Minimize the risk of invasive species in order to protect the sustainability and utilization of the marine resources and sector-wide economic activities like as fishing, agriculture or tourism.

- Establish a national task force (NTF)

- Prepare and establish national legislations, guidelines and a regulatory framework on BWM

- Coordinate all the regional initiatives

CHAPTER FOUR

ELEMENTS OF NIGERIA'S BALLAST WATER MANAGEMENT STRATEGY

Existing national ballast water management strategies differ from each other in several ways, in terms of structure as well as in terms of technical content and overall approach. This reflects the different legal and institutional environments as well as national bio-geographical characteristics and interests. Most national ballast water management strategies do, however, share many aspects of both content and procedure of development.

In the following sections a detailed step-by-step approach to developing Nigeria's national ballast water management strategy is laid out, with practical hints and concrete suggestions.

The steps have been developed in accordance with the IMO GloBallast guidelines monograph 18. The Steps required in establishing a National BWM Strategy for Nigeria includes:

4.1 Designation of Lead Agency for BWM

The lead Agency for ballast water management in Nigeria is the **Nigerian Maritime Administration and Safety Agency (NIMASA)**. This is the national maritime administration and the Port State Control of Nigeria and it has been the Agency designated by the Government of the Federation as National Focal Point for all IMO matters.

Its offices are at **Nigerian Maritime Administration and Safety Agency (NIMASA),** MARITIME HOUSE, 4 BURMA ROAD, APAPA, LAGOS, NIGERIA
Tel: +234 -1-271 2680 Fax: +234 1 271 3617

The responsibilities of the Lead Agency shall include as stated on Table 5 below:

Table 5: RESPONSIBILITIES OF THE LEADING AGENCY

Implement the national strategy

Establish the national legislations

Implement the ballast water management activities to all ships calling at Nigerian ports

Ensuring that all key stakeholders are fully conversant with the National Strategy through strong awareness programmes

Monitoring and reviewing on an ongoing basis how effectively the National Strategy is being implemented and introducing changes, as necessary;

Ensuring effective enforcement of national legislation

Administration of relevant international instruments related to ballast water management

Incorporating into the National Strategy improved measures that become possible due to experience gained in operating the National Strategy and/or through developments in research or technology, or changed international requirements or 'best practice

Participating in international, regional and national matters relating to BWM

In general the overall responsibility of the Lead Agency shall be to address the following:

- Integration of the National Strategy into pertinent national policies/strategies and ensuring that necessary legislation is in place
- Devising and ensuring implementation of necessary scientific, operational and administrative arrangements for all ships visiting any of Nigeria's ports
- Ensuring that all key stakeholders are fully conversant with the national strategy, are appropriately trained and properly authorized to act on its behalf, as and when required
- Monitoring and reviewing on an on-going basis how effectively the National Strategy is being implemented and introducing changes, as

necessary
- Ensuring effective enforcement of all national or state-level BWM laws and regulations
- Administration of relevant international instruments related to BWM
- Incorporating into the National Strategy improved measures that become possible due to experience gained in operating the National Strategy and/or through developments in research or technology, or changed international requirements or 'best practice"
- Ensuring the liaison and cooperation with all key stakeholders
- Participating in all international, regional and national matters relating to BWM

Specifically, the Lead Agency –NIMASA shall undertake the:

1. Designation of a Contact Point and/or an Assistant Contact Point
2. Establishment of National Task Force (NTF) for BWM matters in Nigeria: it shall be established for the purpose of advising and supporting the process of developing a national BWM Strategy across Nigeria.

4.2 THE NATIONAL TASK FORCE (NTF)

The NTF for BWM in Nigeria shall be composed of relevant Stakeholder groups drawn from representatives of :

- National maritime administration- NIMASA
- Port administration- National Ports Authority-NPA
- Environmental administration- Federal Ministry of Environment and Coastal States Ministries of Environment in the Nine coastal states – Lagos, Ogun, Ondo, Edo, Delta, Bayelsa, Rivers, Akwa Ibom and Cross River States
- Fisheries/marine resources administration- National Fisheries Dept of the Fed Min of Agriculture
- Health/quarantine administration – Fed Min of Health
- Local government/Coastal States
- Marine science community/ academia- Marine Science Dept and Chemistry Department, University of Lagos
- Shipping industry
- Port users
- Non-government environmental organisation(s), as appropriate
- National maritime training organizations

3. Nigeria's NTF needs to formalize all MOUs and Agreements such as the LPC agreement with IMO-GloBallast Office, London as a priority step upon inauguration
4. Development of a National Action /Work Plan for the Nigerian NTF with timelines.

4.3.2 Responsibilities of the National Task Force

The national task force shall consist of all the above mentioned stakeholders. The working system and responsibilities of the task force shall be as defined below:

Responsibilities of the task force

- Task force evaluates the ballast water implementation activities politically, strategically and legislatively and produces suggestions for revision.
- Task force revises the national strategy document
- Task force implements the necessities of the National Strategy;
- Task Force develops and implements an evaluation plan;
- Task Force potentially continues to work together after the development of the National Strategy to provide guidance, oversight, and advice on matters relating to harmful aquatic organisms and pathogens

Working system of the task force

- NIMASA will lead the task force
- NIMASA shall serve as the Secretariat of the NTF and shall facilitate all Meetings of the NTF

-The task force shall meet every SIX months (twice a year and regularly)

- If there is an extra meeting suggested from a member then the task force organizes an intersessional meeting
- The members of the task force communicate via correspondence group between meetings
- Sub groups of the NTF could be established for evaluating the different kind of tasks
- All the decisions of the task force will be given by consensus
- After every task force meeting, the Secretariat (the lead agency) will publish the minutes of the meeting.

Funding Of The Task Force

It is planned and anticipated that all funding for BWM strategies once adopted by the national administration and legally enforced shall be provided or steps taken to be provided by the National Administration through annual budgets, User Fees, Fines (as in the Polluter-pays-Principle).

4.3 DIVISION OF LABOUR

STAKEHOLDER	RESPONSIBILITY
NIMASA	It is the leading agency for ballast water implementations. All the implementations on ballast water management will be carried out by NIMASA • Implementing the national strategy • Preparing the national legislation • Implementing the port state and flag state rules • Leading the national task force and control and direct the activities of the task force • Monitoring the implementation of the strategy • Monitoring the implementation of the national legislation • Making the revisions on the strategy document • Participating the international studies on ballast water management
NPA	-Port administration -Management of port reception facilities -Inventorisation of all maritime traffic and shipping patterns, goods transported, routes and ports used -Identification and provision of records of all ships arrivals - Identification of port capacities, including capacity to handle different ship types and especially BW operations
FMEnv	• Controlling the land based invasives and integrate with the ballast water managements system • Assist in awareness –raising programmes • Liaison and cooperating with the leading agency in enforcement of BWM laws across the nation

	• Assist in awareness –raising programmes • Consulting with the leading agency
The Nigerian Navy	• Controlling the ballast water discharge forbidden zones - Consulting with the Lead Agency
Coastal States Ministries of Environment	• Controlling the land based invasives and integrate with the ballast water managements system • Assist in awareness –raising programmes
Fed Ministry of Agriculture (FISHERIES DEPT)	Controlling the land based invasives and integrate with the ballast water managements system • Controlling the invasives from ship farming - Assist in awareness –raising programmes • Consulting with the leading agency
Fishermen Cooperatives	• Report the observations about the new species or fish stocks to NIMASA
Nigerian Shippers Council	-Informing the Nigerian maritime sector about the implementations of the ballast water management activities -Assist in awareness –raising programmes • Consulting with the leading agency
Marine Science/ Chemistry Depts, University Of Lagos	After finalizing the national ballast water management strategy, the UNILAGCONSULT shall be • Consulting to the leading agency • Analyzing the ballast water samples • Reporting any invasives detected • Participating the international studies with NIMASA • Assist with Reviews of the national BWM Strategy and introduce changes as necessary
Universities and Nigerian Insititute for Oceanography and Marine Research	-Consulting with the leading agency • Executing the port biological baseline surveys • Reporting any invasives detected
African Circle (Nig) Ltd	• Executing the sediment reception from ships • Coordinating the installation of ballast water treatment equipments • Reporting the activities to the lead agency

Shipbuilders and Dry-docking Organisations	• Coordinating and ensuring the installation of ballast water treatment equipments
MEM Dept of NIMASA and Surveyors	• Executing the ballast water management inspections • Giving permission to ships with respect to ballast water reporting forms
Port Managers	• Assist the harbor masters/surveyors on inspection activities -Facilitate ship inspections for all ships on arrival
Shipping Agents	• Fill the ballast water reporting forms accurately using agreed format
NGOs	• Informing the public and raising awareness • Assist the port biological baseline survey studies -Raise alarms for on nay hidden violations

CHAPTER FIVE

STRATEGIC PRIORITIES FOR NIGERIA'S BALLAST WATER MANAGEMENT

IMMEDIATE ISSUES FOR THE NIGERIAN NTF

a. Set-up Administrative infrastructure for BWM
b. Development of NTF Rules of Procedures c. c. c. Introductory course on BMW for Lead Agency staff and selected relevant stakeholders -using IMO's 9-module 4-day course
c. Awareness/Training Workshop/Programmes to sensitize the shipping community on the problems of ballast water and the Convention on ballast water (for Shipping Industry stakeholders including Ship Owners, Oil Industry, Cabotage Office etc)
d. Preparation of Current Country Status Report as adopted by Glo Ballast Partnership Project Task Meeting,Mar.2008

SHORT TERM MEASURES FOR NIGERIAN STRATEGY

a. Development and endorsement of a National Policy document for BWM
b. Formulation of a National Strategy Document for BWM
c. Draft and enact Legislation for implementation of Policy and Strategy Document
d. Organise Training Course for Maritime Lawyers
e. Establishment of Guidelines and Standards for Ballast Water Management for Nigeria
f. Establishment of Cooperation programmes with all Coastal States in Nigeria

LONG TERM MEASURES FOR NIGERIAN STRATEGY

a. Development and endorsement of a National Action Plan document for BWM
b. Establishment of a globally recognised and integrated analytical laboratory
c. Risk Assessment, Survey and Monitoring of Invasive Alien Species

CHAPTER SIX

IMPLEMENTATION ACTION PLAN or ROADMAP FOR BMW IN NIGERIA

Following an IMO training Workshop on Ballast Water Management in Nigeria in February 2010, Nigeria commenced actions towards instituting BMW plans and infrastructure for the country. An NTF was constituted and a Technical SubCommittee of the NTF was set-up. The Technical Subcommittee under Prof B.I. Alo of the University of Lagos set to work and put together An Implementation Plan/ RoadMap/Action Plan towards establishment of BWM fully in Nigeria by 2012.

It is important to state that this Plan includes proposed institutional arrangements-responsibilities, task forces etc; Information gathering processes and procedures; Communication, Training and Awareness Raising Plans; proposals on institutional and legal reforms at national level etc.

Appended below is a copy of the Roadmap as put together and being implemented by the Lead Agency and National Focal Point –the NIMASA.

ROAD MAP (WITH TIMELINES) FOR SHIPS' BALLAST WATER MANAGEMENT IN NIGERIA

S/No	Description of Activity	Action	Role/ Responsibility	Remarks
1.	Designation of Lead Agency for BWM	Nigerian Maritime Administration and Safety Agency (NIMASA)	Responsible for convening and creation of National Task Force (NTF) and development and implementation of the necessary country-level information	Done
2.	Designation of a Contact Point	Director General, NIMASA	National Task Force Chairman	Done
3.	Designation of a Contact Point Assistant	Director, Marine Environment Management, NIMASA	National Task Force Secretary	Done
4.	Establishment of National Task Force (NTF)	National Task Force (NTF) on BWM in Nigeria	Established for the purpose of advising and supporting the process of developing a national BWM Strategy	Established on 18th Feb.2010 Primarily advisory role but may become a permanent structure for overseeing implementation of strategy

National Task Force (NTF) Membership	**Stakeholder groups drawn from** • **National maritime administration** • **Port administration** • **Environmental administration** • **Fisheries/marine resources administration** • **Health/quarantine administration** • **Local government/Coastal States** • **Marine science community/ academia** • **Shipping industry** • **Port users** • **Non-government environmental organisation(s), as appropriate** • **National maritime training organisations**	**Mrs J. Gunwa- National Task Force Secretary**	**Letter to NTF membership organizations to formally constitute the NTF and stress the need for continuity with respect to participation** **4th Mar.2010**
NTF to formalize the LPC agreement with IMO-GloBallast Office, London	**Alternate Permanent Representative (APR) to IMO to coordinate and handle**	**Mr Azuh o give feedback at the next NTF Meeting .**	**March, 2010**
Development of a National Action /Work Plan for NTF	**Seven-man panel headed by Prof B.I. Alo inaugurated on 18th Feb.2010**	**Prof Alo & Committee to produce draft of National Action/Work Plan for NTF**	**4th Mar.2010**

Development of a Draft National Action /Work Plan for NTF	**IMMEDIATE ISSUES:** **i. Set-up Administrative infrastructure for BWM**	**Lead Agency**	**1st Quarter,2010**
	ii. Development of NTF Rules of Procedures	**Alternate Permanent Representative (APR) to IMO to develop draft for comments**	
	iii. Introductory course on BMW for Lead Agency staff and selected relevant stakeholders -using IMO's 9-module 4-day course	**National Task Force through Lead Agency**	**Ist Quarter,2010**
	iv. Awareness/Training Workshop/Programmes to sensitize the shipping community on the problems of ballast water and the Convention on ballast water (for Shipping Industry stakeholders including Ship Owners, Oil Industry, Cabotage Office etc)	**National Task Force through Lead Agency**	**Ist Quarter,2010**
	v. Preparation of Current Country Status Report as adopted by Glo Ballast Partnership Project Task Meeting,Mar.2008	**National Task Force through Lead Agency**	

			Ist Quarter,2010 **March,2010** **Two page document to highlight current status. Glo-Ballast Partnership** **Template available**

9	**Development of a Draft National Action /Work Plan for NTF**	**SHORT TERM MEASURES** **(1) Development and endorsement of a National Policy document for BWM** **(2) Formulation of a National Strategy Document for BWM** **(3) Draft and enact Legislation for implementation of Policy and Strategy Document.**	**National Task Force through Lead Agency to approach IMO-Glo Ballast Partnership fo r support/Consultant to** ***undertake*** ***(a) National Rapid Status Assessment with respect to:*** • ***Shipping*** • ***Marine & Coastal Environment*** • ***Marine bio-invasion sin Nigeria*** • ***Legal, Policy & Institutional Frameworks*** • ***Stakeholder information*** ***(b) National Economic Assessment*** **National Task Force through Lead Agency to approach IMO-Glo Ballast Partnership for s upport/Consultant to** ***undertake*** ***(a) Domestication of Ballast Water Management Convention in line with the Model Ballast Water Management Act*** ***(b) Align policies and institutional requirement and arrangements in accordance with the Legislative reforms*** **National Task Force through Lead Agency to approach IMO-Glo**	**National Policy provides broad aims** **2nd Quarter,2010** **National Strategy identifies action requirements** **2nd Quarter,2010** **2nd Quarter,2010**

			Ballast Partnership to *organize the GCLME Training for Maritime Lawyers*	***Planned for May/June 2010***
		(4) Training Course for Maritime Lawyers	**National Task Force through Lead Agency**	**2nd Quarter,2010**
		(5) Establishment of Guidelines and Standards for Ballast Water Management for Nigeria	**National Task Force through Lead Agency**	**2nd Quarter,2010**
		(6) Establishment of Cooperation programmes with all Coastal States in Nigeria		

10.	**Development of a Draft National Action /Work Plan for NTF**	**LONG TERM MEASURES** **(1) Development and endorsement of a National Action Plan document for BWM**	**National Task Force through Lead Agency to approach IMO-Glo Ballast Partnership for support/Consultant to:** **(a) Establish country-wide Demo Projects/Case Studies in coastal States** **(b) Establish BW control Guidelines/Training course on Compliance Monitoring and Enforcement (CME), In particular for LA control officers' requirement, industrial information/notices and documentation.** **(c) Installation of ballast water reception and treatment facilities, for example on a Build Operate and Transfer (BOT) basis.** **National Task Force through Lead Agency to approach IMO-Glo Ballast Partnership to seek support of Global Environmental Facility (GEF)/UNDP**	**National Action Plan specifies the detailed practical activities with specified time frame. Provide budget.** **3rd Quarter,2010** **3rd Quarter,2010** **3rd Quarter,2010** **3rd Quarter,2010**
		(2) Establishment of a globally recognised and integrated analytical laboratory	**National Task Force through Lead Agency**	

		(3) Risk Assessment, Survey and Monitoring of Invasive Alien Species		**3rd Quarter,2010**

ACTION PLAN IMPLEMENTATION TIME TABLE

Action Points	Activities	Yr 2010	Yr 2011	Yr 2012	Yr 2013	Yr 2014	Yr 2015
Action 1 **Designation of Lead Agency and Contact Point**	**NIMASA Agency actions**	✓					
Action 2 **Establishment of National Task Force (NTF)**	**Constitution of Nigeria NTF for BWM**	✓					
Action 3 **NTF to formalize LPC agreement with IMO-GloBallast Office, London**	**Alternate Permanent Representative to handle**	✓					
Action 4 **Development of National Action Plan**	**Seven-man panel headed by Prof B.I.Alo to produce Draft of National Action Plan for NTF to consider**	✓					
Action 5 **Setup administrative infrastructure for BMW**	**Lead Agency action**	✓	✓				
Action 6 **Capacity-building – Introductory**	**NIMASA to organize using IMO's 9-module 4-day course**		✓				

Course for Lead Agency staff and selected stakeholders on BWM						
Action 7 **Preparation of current Country Status Report as adopted by GloBallast Partnership Project Task Meeting**	**National Task Force through Lead Agency to undertake baseline biological surveys**	✓	✓		✓	✓
Action 8 **Prepare Certification procedures and supply inspection equipment**	**N**IMASA to -organize the procedures for BW Certification in Nigeria -supply inspection kits and equipment		✓	✓		
Action 9 **Organise Awareness/Training Programmes to sensitise the shipping community on BW and the Convention (for ship owners, Shipping agents, Oil industry, Cabotage Office**	NTF and Lead Agency to -organize a symposium -prepare booklets, leaflets, posters etc -setup a Website on BWM in NIgeria		✓	✓		
Action 10 **Development and endorsement of a National Policy document for BWM**	**NTF and NIMASA**		✓			
Action 11 **Development and**	**NTF and NIMASA to - organize Training for Maritime lawyers**	✓				

enactment/gazetting of Legislation or Bye-law for implementation of the BWM Policy document	**- organize drafting of legislation or existing law reform**	✓			
Action 12 **Establishment of guidelines and standards for BWM in NIgeria**	**NTF and NIMASA to organize drafting liaising with experienced stakeholders-academics, researchers etc and with IMO support**	✓	✓		
Action 13 **Establishment of cooperation programmes with coastal States of Nigeria and line Ministries**	**NTF and NIMASA to** **-organise Meetings with all coastal states and line Ministries/parastatals**	✓	✓	✓	
Action 14 **Establishment of a globally recognised and integrated analytical laboratory**	**NTF and NIMASA to approach IMO- Globallst to seek support of GEF funding**	✓	✓	✓	
Action 15 **Installation of BW reception and treatment facilities for example on a Build-Operate-transfer basis**	**NTF and NIMASA to woo investors to install**	✓	✓	✓	✓
Action 16 **Establish BW control guidelines/training course on Compliance Monitoring and**	**NTF and NIMASA**	✓	✓		

Enforcement (CME)						
Action 17 **Establish country-wide Demo Projects/Case Studies in Coastal States**	**NTF and NIMASA**		√	√	√	√
Action 18 **Undertake Risk Assessment Survey and Monitoring of Invasive Species**	**NTF, NIMASA commissioning Consultants from academia and Research institutes**	√	√	√	√	√
Action 19 **International coordination and participation in international activities**	**NTF and NIMASA to** **-instigate and participate in regional meetings** **-attend and participate in international meetings, conferences etc**	√	√	√	√	√
Action 20 **Undertake and establish Pilot implementation projects**	**NTF and NIMASA to confirm workability of guidelines and standards through pilot projects in selected ports**					
Action 21 **Establish allowable ballast water discharge zones in Nigeria**	**NTF and NIMASA to organize Meeting to select and delineate allowable Zone to be enforced**	√	√			

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