

**Intergovernmental Oceanographic Commission**  
*Reports of Meetings of Experts and Equivalent Bodies*



**IOC-IUCN-NOAA  
Consultative Committee Meeting  
on Large Marine Ecosystems  
(LMEs)**

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# TABLE OF CONTENTS

<b>1.0 INTRODUCTION and IOC Welcome</b>	<b>5</b>
<b>2.0 A REPORT FROM THE IUCN</b>	<b>5</b>
<b>3.0 LME METHODOLOGY</b>	<b>6</b>
<b>4.0 LME PROJECT STATUS</b>	<b>6</b>
<b>4.1 The Agulhas and Somali Currents Large Marine Ecosystem Project</b>	<b>6</b>
<b>4.2 Benguela Current LME Project Status</b>	<b>9</b>
<b>4.3 The Gulf of Mexico LME Project</b>	<b>12</b>
<b>4.4 The Yellow Sea LME Project</b>	<b>13</b>
<b>4.5 The Bay of Bengal LME Project</b>	<b>15</b>
<b>4.6 The Baltic Sea LME</b>	<b>16</b>
<b>4.7 The Barents Sea and West Bering Sea LMEs</b>	<b>17</b>
<b>4.8 The Caribbean Sea LME</b>	<b>17</b>
<b>4.9. The Mediterranean Sea LME Project</b>	<b>18</b>
<b>5.0 UN AGENCY PERSPECTIVES ON GEF LME PROJECTS</b>	<b>19</b>
<b>5.1 The IOC-UNESCO and development of a GEF funded Project</b>	<b>19</b>
<b>5.2 The FAO supported GEF LME Projects</b>	<b>20</b>
<b>5.3 The UNIDO supported Guinea Current LME Project</b>	<b>21</b>
<b>5.4 The UNDP supported GEF LME Projects</b>	<b>22</b>

<b>6.0 LME METHODOLOGIES</b>	<b>23</b>
<b>7.0 THE GEF COMMUNITY OF PRACTICE FOR LEARNING AND EXPERIENCE SHARING AMONG GEF FUNDED LME PROJECTS AND THE ROLE OF ICES</b>	<b>25</b>
<b>ANNEXES</b>	
<b>I. AGENDA</b>	<b>28</b>
<b>II. LIST OF PARTICIPANTS</b>	<b>31</b>

The Eleventh Consultative Committee Meeting on Large Marine Ecosystems (LMEs) was held on 9-10 July 2009. The consultation was convened by the Intergovernmental Oceanographic Commission (IOC) of UNESCO, the US Department of Commerce's National Oceanic and Atmospheric Administration (NOAA), and the World Conservation Union (IUCN). It was hosted by IOC at UNESCO headquarters, Paris, France. The meeting was co-chaired by IOC Executive Secretary, Dr. Patricio Bernal, and Dr. Kenneth Sherman of NOAA. The meeting agenda is given in ANNEX I and a list of attendees is provided in ANNEX II. The powerpoint presentations of the meeting are available on the LME website at: [www.lme.noaa.gov/](http://www.lme.noaa.gov/).

## ***1.0 INTRODUCTION and IOC Welcome***

Dr. **Patricio Bernal**, General Secretary of the IOC-UNESCO, welcomed the group to the Meeting. In his remarks he indicated that the LME Community is now well established as a unique and healthy organization of scientists, international marine policy experts, and persons representing several UN agencies and NGOs. Two reports were recently published by the IOC and are available on the IOC website: one by Sybil Seitzinger et al., "Filling gaps in LME Nitrogen forecast for 64 Large Marine Ecosystems" (IOC technical series No. 79), and the other by Villy Christensen et al., "Models of the World's Large Marine Ecosystems" (IOC technical series No. 80). The recently published 872-page "UNEP Large Marine Ecosystem Report – a Perspective on Changing Conditions in LMEs of the World's Regional Seas" is a milestone achieved on the ground by agencies and scientists from all over the world to improve the management of LMEs. Common lessons from the projects funded by the Global Environment Facility (GEF) are being learned. The IOC team has expanded: Dr. Bernal introduced the new IOC Ocean Science Section Head, Dr. Jorge Luis Valdes who has been active as the representative of Spain at ICES.

## ***2.0 A REPORT FROM THE IUCN***

**Carl Gustaf Lundin**, Head of the IUCN Global Marine Programme, described recent activities as they relate to the LME community. The IUCN holds a congress every four years. Held in October 2008 in Barcelona, it was attended by 8,000 people. Products presented at the congress included a newly designed tool kit for managing marine protected areas, and DVDs and CDs on oceans and climate change. In its final days, the Bush Administration created the largest MPA in the world in Pacific Hawaii. Australia has launched a large MPA in the the Coral Sea. Other MPAs are being designated in Southeast Asia. Two important ocean issues require more attention with regard to the effects on the sustainability of coastal ocean goods and services: (i) global climate change, and (ii) acidification of the oceans. The IUCN has been supporting recent studies on coral reefs and ecosystem resilience. One of the outcomes of recent studies of corals is a guide being published by the IUCN on coral bleaching. Action needs

to be taken very soon or more reefs will be lost to bleaching. The IUCN has recently published on the topic of invasive species and their relation to climate change, and on renewable ocean energies. It has also issued 10 high seas principles of governance. Beyond national jurisdiction, many human activities remain unregulated. Ecosystem considerations are seldom taken into account and scientific information is often ignored. A participant commented on the big governance gap in the high seas, to which Mr. Lundin replied that there are General Assembly resolutions (e.g. drift net ban, bottom trawling in the high seas), and the high seas are subject to the applications of customary law.

### **3.0 LME METHODOLOGY**

**Kenneth Sherman** discussed indicators of changing states of Large Marine Ecosystems during climate change. LMEs are delineated according to ecological criteria rather than political. He presented the results of the recently published 872-page “UNEP Large Marine Ecosystem Report – a Perspective on Changing Conditions in LMEs of the World’s Regional Seas”. Of particular interest is the research recently accomplished on accelerated warming and emergent trends in fisheries biomass yields in the world’s LMEs. He contrasted the Norwegian, Faroe Plateau and Iceland shelf LMEs, where the fisheries biomass yield is increasing, with the North Sea, Celtic Biscay and Iberian Coastal LMEs, where it is decreasing. The new Obama Administration and Dr. Jane Lubchenco at the helm of NOAA will help the cause of ecosystem-based management. He also stressed the importance of maintaining a strong scientific foundation in each of the LME projects. The LME network has expanded into a movement. A new book, “Sustaining the World’s Large Marine Ecosystems”, was published in 2009. It includes selected peer reviewed papers presented to the IUCN Barcelona Congress of 2008. The book describes the results of the global movement underway to operationalize the LME approach in support of the assessment and management of coastal ocean goods and services.

### **4.0 LME PROJECT STATUS**

#### **4.1 *The Agulhas and Somali Currents Large Marine Ecosystem Project***

**David Vousden** reported on the Agulhas and Somali Currents LME (ASCLME) Project and made the case for a long-term monitoring and early warning mechanism for monitoring ocean-atmosphere change and ecosystem variability. The project monitors the biological, chemical, and physical oceanography of the LME, and also addresses the coastal artisanal and subsistence fisheries, persistent organic pollutants, larval fish transport, and spawning and nursery areas. Understanding climatic variability is critical to the sustainability of LME processes. Climatic impacts include change in water

temperatures and salinities, sea level rise, increasing extremes in ocean acidification, and more frequent and greater storm surges. Entire ecosystems can shift in terms of their physicochemical/biological characteristics, described most effectively at the modular level: for productivity (in  $\text{gCm}^{-2}\text{y}^{-1}$ ), and changes in temperature, salinity and pH; for fish and fisheries, the transboundary migration of finfish stocks (changes in temperature and food availability); and loss of shellfisheries through ocean acidification. For the pollution and ecosystem health module, Dr. Vousden stressed the importance of mitigation actions for recovering the loss of coral reefs through acidification, migration of critical habitat (seagrasses and mangroves through temperature change), and loss of coastal resources and habitats through storm surges. He indicated that these impacts will then be felt in terms of the human dimension: loss of food resources; threats to national and regional economies (tourism, commercial fisheries); and eroding coastlines leading to major changes in artisanal fisheries. For the governance module, he stated that management policy must reflect ecosystem changes and rely on solid scientific baselines and indicators of climatic variability based on monitoring, an early warning system and predictive modelling.

Within the framework of the ASCLME Programme, nine countries (Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia, South Africa, Tanzania) are participating in a 5 year project (2007-2012), funded at a level of \$12.2 million with \$20 million in co-funding. The ASCLME Project, executed by the UNDP, will deliver a TDA identifying the overall characteristics and threats to the sustainable function of the two LMEs; a SAP specifying the policy, governance and management procedures to be adopted by the participating countries; and long-term mechanisms for management and governance. Partnering with the project are WIOLaB (UNEP), that addresses land-based activities in the Western Indian Ocean, and SWIOFP (World Bank), the Southwest Indian Ocean Fisheries Project focusing on offshore and near-shore commercial fisheries

The 2008 ASCLME project cruise focused on Madagascar, Mauritius, and the Mozambique Channel. The *R.V. Nansen* was the primary blue-water ecosystem assessment vessel used, but the project also negotiated the use of other vessels, including the *Algoa*, the *Africana*, the *Ellen Khuzwayo* (all from South Africa), and the *James Cook* (UK), to support long-term data collection and monitoring requirements, with ATLAS moorings, Argo floats, satellite drifters, ADCP moorings, and UTRs. The ASCLME Project is also capturing data for the TDA process relating to coastal habitat types (particularly nursery and spawning areas of threatened species), coastal livelihoods mapping (small-scale, artisanal and subsistence fisheries, mariculture activities, and coastal tourism), invasive species (from ballast waters and international transportation), and marine pollution from shipping, chemical spills, and extraction of natural resources. The cruise provided the opportunity to train 21 scientists in 2008 and 2009. Data collection and analysis will drive the development of national marine ecosystem

diagnostic analyses that will be amalgamated into a TDA for each LME. The project website at [www.asclme.org](http://www.asclme.org) provides more information.

**Sarah Gotheil**, representing the IUCN, discussed the Agulhas and Somali currents LME project linkages to the adjacent western Indian Ocean seamounts at a time of climate change. The seamount IW project (2009 – 2011), an MSP funded by GEF and implemented by the UNDP, is focused on restoring and sustaining coastal and marine fish stocks and associated biological diversity. It partners with the FAO and the *Nansen* Project, the Norwegian Agency for Development Cooperation (Norad), and the ASCLME. Its overall goal is to apply an ecosystem-based approach to fisheries management for biologically significant and commercially important areas beyond national jurisdiction focusing on the seamounts of the southern Indian Ocean. Seamounts are hotspots of biodiversity and areas of strong benthic pelagic coupling. They provide coral habitats for commercially important species.

The project has four objectives: (i) a biodiversity assessment to help improve the scientific understanding and capacity for monitoring, assessment and analysis of high seas biodiversity and fisheries. Not much is known about the seamount ecology and biodiversity of the southern Indian Ocean, seamount benthic communities, pelagic species, the impacts on fishing activities, and the potential effectiveness of benthic protected areas. A *Nansen* cruise in the Southwest Indian Ocean Ridge in November-December 2009 will focus on pelagic ecosystems and biodiversity, pelagic fishery resources and oceanography. A second cruise in 2010 or 2011 will focus on benthic ecosystems and biodiversity, benthic fishery resources, and an impact assessment of bottom fishing activities. The 5 seamount areas to be explored are all in the high seas. (ii) The second project objective is to develop a governance framework and legal regime for high seas resource conservation and management. The project will undertake an institutional and legal gap analysis and provide a list of options for the improvement of the legal and institutional framework of the SIO. Present global legal instruments include UNCLOS, the CBD, and the United Nations Fish Stocks Agreement (UNFSA) for the sustainable management of high seas highly migratory and transboundary fish stocks. Regional instruments include the Indian Ocean Tuna Commission (IOTC), focusing on tuna and tuna-like species, and the South Indian Ocean Fisheries Agreement (SIOFA), not yet in force, focusing on deep-sea fisheries. (iii) Objective 3 focuses on management and compliance options for deep and high seas biodiversity in the southern Indian Ocean, based on the precautionary and ecosystem-based approaches. (iv) Objective 4 is focused on outreach, to raise awareness and share knowledge with policy makers, the fishing industry and the public, through a website and cruise blog, films, and a pictorial book on seamounts.

## 4.2 Benguela Current LME Project Status

**Hashali Hamukuaya**, Chief Technical Advisor of Benguela Current Commission, provided a summary of the Benguela Current LME (BCLME) project and discussed the replicability of its best practices to other GEF LME projects. The project, funded at a level of \$33 million, was completed in 2007. Its goal was the integrated management, sustainable use and protection of the BCLME. The main threats to the ecosystem are extreme events, including Benguela Niño's, harmful algal blooms, low oxygen water, and sulphur eruptions. The four main components of the marine economy of the three participating countries of the Benguela Current LME -- Angola, Namibia and South Africa -- are offshore oil and gas (69%), diamond mining (15%), coastal tourism (11%), and fisheries (5%). Major transboundary issues are the decline in commercial fish stocks, the uncertain status and yield of a complex and highly variable LME, an inadequate capacity to assess the ecosystem, a deterioration in water quality, habitat destruction and alteration, loss of biodiversity, and harmful algal blooms. In drafting the SAP, the three countries agreed on the following principles: ecosystem integrity for future generations, use of the precautionary principle, anticipatory action e.g. oil spills and HABs, the use of the 'polluter pays' principle and clean technologies, transparency and public participation, and partnerships with private industry and other donors. Key policy actions agreed upon in the Project SAP are to carry out joint surveys and assessment of fish stocks, harmonize the management of shared stocks and environmental policies, operationalize an ecosystems approach to fisheries management, develop an environmental early warning system, establish marine protected areas, establish a regional oil spill contingency plan, and map vulnerable species and habitats.

More than 100 projects have been successfully completed, including those summarized in **Table 1** as the principal and highlighted achievements of the completed projects in the BCLME. Some of these can be replicated as best practices in other GEF LME projects.

**Table 1:** Projects completed by the BCLME Project.

(i) Productivity Module	Projects completed
	Complex and variable ecosystem: climate change and impacts on BCLME primary productivity assessed
	Monitoring capacity developed

<b>(ii) Fish and Fisheries Module</b>	
	<b>Transboundary Fisheries Management:</b>
	<ul style="list-style-type: none"> <li>✓ Development of an Ecosystem Approach to Fisheries (EAF) in partnership with FAO and WWF</li> </ul>
	<ul style="list-style-type: none"> <li>✓ Annual trans-boundary surveys of shared hake stocks Namibia-South Africa (R.V. <i>Dr Fridtjof Nansen</i>)</li> <li>✓</li> </ul>
	<ul style="list-style-type: none"> <li>✓ Annual trans-boundary surveys of shared Sardinella stocks in Angola-Gabon (R.V. <i>Dr Fridtjof Nansen</i>)</li> </ul>
	<ul style="list-style-type: none"> <li>✓ Annual trans-boundary surveys of shared horse mackerel and pilchard in southern Angola – northern Namibia (R.V. <i>Dr Fridtjof Nansen</i>)</li> </ul>
	<ul style="list-style-type: none"> <li>✓ Monitoring ecosystem health using top predators (seals, seabirds, whales)</li> <li>✓ Reduction of by-catch of seabirds, pelagic sharks and turtles accidentally caught by longliners</li> </ul>
<b>(iii) Pollution and Ecosystem Health Module</b>	
	Regional water quality guidelines developed
	<b>Marine biodiversity:</b>
	<ul style="list-style-type: none"> <li>✓ Coastal sensitive areas mapped (GIS)</li> <li>✓ Species threats assessment analyses</li> <li>✓ Estuarine, inshore and offshore habitats mapped (GIS)</li> <li>✓ Assessment of marine protected areas</li> <li>✓ Conservation status database</li> </ul>
	A Regional Conservation Management Plan is in progress
	<b>Management of marine pollution:</b>
	<ul style="list-style-type: none"> <li>✓ Regional water quality guidelines developed</li> <li>✓ Assessment of land-based sources of marine pollution</li> <li>✓ Marine Litter demonstration project (Luanda, Walvis Bay)</li> </ul>

	<b>Managing impacts of offshore oil and gas and other industrial resources on the LME:</b>
	<ul style="list-style-type: none"> <li>✓ Assessment of regional oil spill contingency and response</li> <li>✓ Assessment of cumulative impacts of sediments discharges on near shore ecosystems particularly on rock lobster stocks</li> <li>✓ Assessment of cumulative impacts of offshore and coastal diamond mining on the marine ecosystem and mitigation of effects managing the impacts of coastal diamond mining.</li> </ul>
	Assessment of cumulative effects of offshore oil exploration and production on the northern BCLME ecosystem, to be completed
	<b>Harmful algal bloom management:</b>
	<ul style="list-style-type: none"> <li>✓ Real-time forecasting</li> <li>✓ Harmonization of microtoxin regulations</li> <li>✓ Shellfish sanitation programme operational</li> <li>✓ Monitoring capacity developed</li> </ul>
<b>(iv) Socioeconomics Module</b>	
	Socioeconomic assessment of artisanal fisheries in Angola, including surveys and review of institutional arrangements, replicable in other LME projects
	Training and capacity building: BSc (8), MSc (12), Phd (3); specialist courses, workshops; computer –IT equipment; English courses, technical writing skills; and data analyses
<b>(v) Governance Module</b>	
	<p>New institutional arrangements:</p> <ul style="list-style-type: none"> <li>• Programme Steering Committee (PSC)</li> <li>• Programme Co-ordinating Unit (PCU)</li> <li>• Activity Centres (AC's)</li> <li>• Advisory Groups (AG's)</li> </ul>
	The Benguela Current Commission (BCC)
	<p>Lessons learned in establishing institutional arrangements: allow one year lead-in</p> <ul style="list-style-type: none"> <li>• Consultative meetings, task and advisory groups very important in project development</li> </ul>

	<ul style="list-style-type: none"> <li>• Strong public relations and dissemination of information should be a key strategic goal</li> <li>• Promotion of international partnerships and links</li> <li>• Political support - senior management and ministerial buy-in</li> <li>• Earlier consultations with industry</li> <li>• Strong links with coastal communities</li> </ul>
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From a governance perspective, 2 ministries are involved from Angola (Fisheries and Environment, Petroleum), 3 from Namibia (Fisheries and Marine Resources, Mines and Energy, Environment and Tourism), and 2 from South Africa (Environmental Affairs and Tourism, Minerals and Energy Affairs). The Benguela Current Commission took 12 years to put in place (1996 - 2008) and was established with great care. GEF has funded a 2nd phase of \$ 5 million to support BCC institutional reforms and to facilitate the development and conclusion of the BCC Treaty within the next four years and make the Commission fully operational and self sustaining, with a mandate, management functions, and an agreement duly signed by the three countries. To involve the public, a public relations office produced a regular newsletter and a film, shown on TV in 3 countries.

### **4.3 The Gulf of Mexico LME Project**

**Porfirio Alvarez**, the newly appointed program manager for the Gulf of Mexico LME (GOMLME) Project, presented an update of the project and its inception meeting and workshop, attended by 120 people who were eager to learn. Under the new Mexican president, work will focus on implementing sea use planning of the Gulf of California LME, launching the spatial planning process in the Gulf of Mexico and Caribbean Sea LMEs, and the preparation of an integrated National Ocean Policy. The objective of a federal decree for the sustainable management of oceans and coasts is to coordinate the actions of federal government agencies and 12 institutions in implementing national policies for the conservation and sustainable development of oceans and coasts in Mexico. The ecosystem approach requires a clear definition of coastal zone areas and the sustainable use of natural resources within the boundaries of the GOMLME. Mexican State and Municipal authorities will jointly develop Integrated Management plans for coastal and Maritime areas.

The challenges facing the Gulf of Mexico LME Project are: to increase coordination with the US and involve Cuba (Cuba's participation would increase the funding for the Project); build capacity for EBM; reduce impacts of climate change and build adaptation strategies; allocate funds for cooperative research; improve and enhance water treatment capacity; and increase ecosystem

resilience through effective fisheries management, improvement of water quality, control of invasive species, control of ocean acidification, and restoration of coral reefs. In 2009, the first ichthyoplankton cruise took place.

#### **4.4 The Yellow Sea LME Project**

**Qisheng Tang** discussed changing states of the Yellow Sea LME, which is affected by both anthropogenic forcing, regime shifts and climate impacts. The LME lies in a warm temperate zone, and its communities are composed of species with various ecotypes. In this LME the food web is relatively complex, with at least 4 trophic levels, and two trophic pathways: pelagic and demersal. The resource populations are multispecies in nature and about 100 species are commercially harvested. Over the past 50 years dramatic changes in species composition, dominant species and community structure have been observed: from small yellow croaker and hairtail in the 1950s and early 1960s to Pacific herring and chub mackerel in the 1970s to Japanese anchovy and sand lance after the 1980s. Small sized, fast growing, short lived and low valued species have increased in abundance and assumed a prominent position in the food web. Over the past 40 years, a trend of obvious decline of phytoplankton biomass has been observed, seemingly linked with nutrient changes. Changes in biomass yields and species shifts in dominance cannot be explained merely by fishing pressure. Climate change may have had important effects on the recruitment of pelagic species and shellfish in the LME.

While some species have shown some stability, the Pacific herring in the Yellow Sea LME has a long history of extreme variability in exploitation. At present, the recovery is not complete. Unusual events have occurred in coastal areas, such as the visit of a false killer whale in Qingdao Bay. There may be two types of shifts in ecosystem resources: systematic replacement, and ecological replacement. Systematic replacement occurs when one dominant species declines in abundance or is depleted by overexploitation, and another competitive species uses the surplus food and vacant space to increase its abundance. Ecological replacement occurs when minor changes in the natural environment affect stock abundance especially pelagic species. In the long term, the effects of the two types of shifts on the marine ecosystem may be mingled.

Major pollutants entering the LME are organic material, oil, heavy metals and pesticides. Pollutants from municipal, industrial, and agricultural wastes and runoff, as well as atmospheric deposition are “fertilizing” coastal areas triggering harmful algal blooms and oxygen deficient ‘dead zones’. The long term objective of the YSLME project is to ensure recovery and sustainability of Yellow Sea LME goods and services by reducing stress and promoting adaptive ecosystem based management practices in an LME that is bordered by a densely populated, heavily urbanized and industrialized coastal area.

**Mark Walton** described the ecosystem based approach of the YSLME Strategic Action Program (SAP). The ecosystem based management effort presently underway is a major effort directed toward recovering the degraded components of an LME. There are complex linkages in the Yellow Sea, making it difficult to point to a dominating driving force of ecosystem change. In addition to clear evidence of overfishing, the pelagic component of the ecosystem is changing. The jellyfish proportion of the catch is increasing, and there was a macro algal bloom in Qingdao Bay in 2008 that came close to closing down the Olympic sailing competition. A study by Liu et al (2009) suggests that the traditional view of the history of Yellow Sea circulation patterns may not be accurate, or maybe they are changing rapidly. The project SAP (October 2008) calls for a major reduction in fishing effort, a rebuilding of over exploited fish stocks, and improved mariculture techniques. In terms of pollution and ecosystem health, it calls for efforts to meet international contaminant requirements, reduce nutrient loading, marine litter, and beach contamination. It also calls for a better ability to predict ecosystem change and improve biodiversity, maintain habitats, and reduce the risks coming from introduced species.

The plan is to reduce stress from overfishing by reducing fishing effort by 30%. China's requirements for sea food are high and the growth of population has put more demand on aquaculture for higher production. While aquaculture can be very damaging, with potential impacts on the environment from fish feed containing lots of nitrogen, and waste production, new methods for mariculture through the concept of integrated multi trophic aquaculture (IMTA) are to meet the gap resulting from the reduction of fishing effort. These methods also show promise for reducing the negative impacts on coastal water quality. According to this approach, and using a correct proportion of fish, oysters and seaweed, the particulate waste in the water column is removed by filter feeding bivalves, while the portion that ends on the seafloor is utilized by sea cucumbers. The dissolved inorganic nutrients (N, P, and CO<sub>2</sub>) are absorbed by the seaweed that also produces oxygen, which in turn is used by the other cultured organisms. There are no nutrients, pathogens, or chemicals released. Less fishmeal is required. The system requires less land area and less seawater. The production is high, with 10kg/m<sup>2</sup>/crop and 2.5 to 3 crops a year. The project is in alignment with China's 5 year plan. Initial results will be available in December 2009. The system is not suitable for all areas, but may be adapted. Questions and comments on this presentation focused on the socioeconomic aspects of retraining former fishermen and on vessel buy back programs. Dr. Huh mentioned that Korea is spending \$700 million to buy back former fishing vessels. The Yellow Sea LME program website is: [www.yslme.org](http://www.yslme.org).

It is important to note that the management actions underway by China and Korea to recover depleted fish and fisheries are based on sustainable fisheries carrying capacity (gCm<sup>2</sup>) metrics based on primary productivity. Two papers addressing the management actions to recover degraded fisheries in the

YSLME are included in the book, “Sustaining the World’s Large Marine Ecosystems”. The book can be downloaded from the LME website at: [www.lme.noaa.gov](http://www.lme.noaa.gov).

#### ***4.5 The Bay of Bengal LME Project***

**Simon Funge-Smith** presented a status report on the Bay of Bengal LME project. While slow to start, the project is operational, has its 8 country signatures, and the RC and CTA are in place. The LME is one of the largest of the world with an area of 3.7 million km<sup>2</sup>. The 8 participating countries (Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka, Thailand) have small GDPs, large coastal populations, extreme poverty and a high dependence on natural aquatic resources, especially fisheries for food, but also for trade. Increased land use is having major impacts on the marine ecosystem. The challenges of this environment are its tropical monsoon systems, storms, increasing in severity, cyclones and risks of flooding. There is significant seismic activity (undersea earthquakes, tsunami), and run off coming from 10 major rivers and deltas, including the Ganges and Brahmaputra. The densities of coastal population are the highest in the world: 400 million people live in coastal catchments, with an expected growth of 20% by 2015. These areas are very vulnerable. There are 8 million part-time and small scale fishers, hugely dependent on fisheries for subsistence and food security. The total annual production is 3,000,000 metric tons. Migratory species include sharks, tunas, turtles, and cetaceans. The massive fishing capacity and high vessel numbers, in the hundreds of thousands, raise questions about the sustainability of the LME. Illegal, unregulated and unreported (IUU) fishing is a big issue.

The fishery stocks and resources of the Bay of Bengal LME are over exploited. There is also habitat degradation, land based pollution, and all the pressures relating to development. An ecosystems approach is required to balance the needs of the human population, the health of the environment, and governance requirements. The BoB LME project’s mission is to establish a Strategic Action Programme to protect the health of the ecosystem and manage the living resources of the Bay of Bengal on a sustainable basis and to improve the food and livelihood security of the region’s coastal population. Some of the issues to be addressed by the SAP are an improved knowledge of the BoBLME’s large-scale processes and their predictability, ecological dynamics and basic health indicators, an improved understanding of small-scale fisheries issues leading to the improved well-being of rural fishing communities, the restoration of depleted stocks, sustainable fisheries, IUU reduction, and the improvement of critical habitats. The project will promote the use of MPAs to conserve regional fish stocks. Regarding the pollution and ecosystem health module, the presenter noted that the cumulative pollution in the LME is very high. The project will establish an effective ecosystem indicator framework and develop an ecosystem wide approach for the management of important coastal pollution issues.

Timelines for 2009 - 2010 are presently being developed and inception and steering committee meetings are planned for November 2009. Some comments from the meeting participants focused on the governance issues in this project, with two power blocks, one on the West coast of the Bay of Bengal, and one on the East coast. The challenge is in bringing the two blocks together in establishing institutional agreements.

#### **4.6 The Baltic Sea LME**

**Jan Thulin** made a presentation on the recovery and sustainability of the Baltic sea LME under conditions of climate warming. The main characteristics of the Baltic Sea LME are its semi-enclosed brackish water area, the persistent vertical layers, the water residence time of 25 years, the unpredictable renewal of bottom water, with frequent stagnation periods, and the low numbers of plants and animals, often stressed. The Baltic Sea is under an international management body made of the 9 countries adjacent to the LME (Denmark, Germany, Poland, Lithuania, Latvia, Estonia, Finland, Sweden, and Russia), and the European Commission. ICES provides scientific advice on fisheries and environmental management. The Baltic Sea LME Project, now completed, created the conditions for an ecosystem based approach to human activities in the Baltic. It also provided significant support in the development of the HELCOM Baltic Sea Action Plan, adopted in 2007. Components of this plan are (i) the control of eutrophication; (ii) the control of hazardous substances; (iii) sustainable maritime activities; and (iv) conservation of Baltic Sea biodiversity.

ICES coordinated a Baltic Sea science plan and implementation strategy. In becoming involved in an EU project called Baltic Sea Science – a Network of Science Agencies (BONUS 169), it was charged by the EU to produce the Baltic Sea science plan and implementation strategy. The call for project proposals in 2007 yielded 50 applications, of which 16 were accepted, funded at a level of 20 million euros for 3 years. In these projects the LME concept is clearly recognizable. Other results are the European Union's overarching marine strategy, national strategic plans, and an increase in public and political awareness of the Baltic and its fish and fisheries, especially cod. ICES activities have been re-organized from thematic advisory committees to a single Science Committee (SCICOM), and a single Advisory Committee, both supported by expert groups. In 2003 – 2007, a huge collection of reports and presentations was assembled. This documentation plays a significant role in transferring the Baltic Sea experience to the rest of the LME community. The documentation is available on the web at: <http://www.ices.dk/projects/balticsea.asp>. A chapter by Jan Thulin on the Baltic Sea LME appears in the recently published book, "Sustaining the World's Large Marine Ecosystems", available on the web at: [www.lme.noaa.gov](http://www.lme.noaa.gov)

#### **4.7 The Barents Sea and West Bering Sea LMEs**

**Gennady Matishov** described climate change indicators of ecological conditions in the West Bering Sea and Barents Sea LMEs. Ecosystems research began in the Barents Sea in 1985, with scientific expeditions beginning in 1992. Based in Murmansk, he has accomplished 40 years of monitoring of ice covered areas. Climate is the key impact factor. For the West Bering Sea, a graph of the relative value (%) of fish species of different orders in the ichthyofauna composition indicates that cod, herring, Alaska Pollock, and red king crab are the main commercial species. Whales and marine mammals are hunted by indigenous people. There are fluctuations in yields of Pacific salmon, invertebrates (squid, shrimp, crab), capelin, Arctic cod, and hydrobionts, species closely related to the aquatic environment, including aquatic insects, algae and plants.

In the Barents Sea LME, priority issues are overfishing and biological degradation. Priority issues needing to be addressed are the reduction of mass commercial species abundance under the influence of overfishing, the consequences to the ecosystem of introducing the red king crab and other alien species introduction, the impact of the oil and gas industry on the LME, the transfer of chemical and radioactive pollutants into the marine ecosystem, the influence of atomic ranges, grounds, and bases of the Navy, and the anthropogenic pollution of coastal zones. During the Soviet period, the introduction of species was popular. The red king crab was introduced into the Barents Sea LME in 1960. After a period of adaptation there was a burst of abundance in the mid 1990s. The red king crab is a competitor with indigenous bottom fauna for food (e.g. mussels, sea urchins, and starfish). Another example is that of the haarder, a species of fish adapted to the Far East, which now dominates in the Sea of Azov. Three quarters of the species of the Sea of Azov are alien species. It has proven impossible to restore some of the indigenous fish species. In 1994, Professor Matishov published a study on radionuclide levels and major transfer directions in the Barents and Kara Seas, and several publications addressing the issues of ecosystem monitoring when developing oil and gas shelf deposits. The Norwegian oil and gas complex "Snow White" is possibly transferring oil and gas pollutants to the Russian Barents Sea LME. An oil spill has led to the massive death of 30,000 birds.

#### **4.8 The Caribbean Sea LME**

**Martin Johnston** presented an update of the Caribbean Sea LME project and adjacent areas. The 23 GEF eligible countries are Antigua and Barbuda, Bahamas, Barbados, Belize, Brazil, Colombia, Costa Rica, Dominica, Dominican Republic, Guatemala, Grenada, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, St Kitts and Nevis, St Lucia, St Vincent and the Grenadines, Suriname, Trinidad and Tobago. Two associated countries are Cuba, Venezuela.

The project had a gestation period from the mid 1990s to the PDF-A in 2005. In 2006, the first Steering Committee meeting took place in Panama to approve the project implementation plan. In the preliminary TDA, the LME was divided into 3 sub-regions. The GEF approved the project in 2008 for 5 years (2009 – 2013). The project's main objectives are the sustainability of the shared living marine resources of the Wider Caribbean Region through robust cooperative governance. Specific objectives are (i) to identify, analyse, and agree upon major issues, root causes and actions required to achieve sustainable management of the shared living marine resources in the Caribbean LME and its adjacent regions; (ii) to improve the shared knowledge base for sustainable use and management of transboundary living marine resources; (iii) to implement legal, policy and institutional reforms to achieve sustainable transboundary living marine resource management; and (iv) to develop an institutional and procedural approach to LME level monitoring, evaluation and reporting.

Fisheries in the LME are artisanal rather than large scale. The region and its institutional organization are complex, with overlapping country membership to WECAFC, ACS, WECAFC LAC, Cariforum, Caricom, Oecs, Ospesca, Olde pesca, and ICCAT. In its TDA and SAP process, the project aims to put in place a system of LME-wide monitoring and build a multi-level policy-cycle based governance framework. The PCU is based in Cartagena. In the TDA process, the project will draft the terms of reference for the fishery thematic studies (flying fish and shrimp and groundfish with WECAFC and large pelagics with CRFM) and conclude contracts. Along with the 23 countries and 2 associated countries, the project's partners are US NOAA, the Cropper Foundation, the Nature Conservancy, Core Ocean Census on Marine Life, Caribbean Regional Fisheries Mechanism, OLDEPESCA, OSPESCA, FAO, IOCARIBE (UNESCO), UNEP, UNDP, University of West Indies (CERMES), University of Miami (Rosentiel School), and the Caribbean Community Climate Change Centre. The pilot projects will include a large pelagics project, a shrimp and groundfish project for the Guianas and Brazil, an Eastern Caribbean flying fish project, a spiny lobster project with OSPESCA, and one on reef fisheries and biodiversity.

#### ***4.9. The Mediterranean Sea LME Project***

**Virginie Hart** provided an update of the Mediterranean Sea Project in relation to climate change. The GEF eligible countries in this LME are: Albania, Algeria, Bosnia and Herzegovina, Croatia, Egypt, Lebanon, Libya, Morocco, Montenegro, Syria, Tunisia and Turkey, and the Palestinian Authority. The project is funded at a level \$12.9 million (GEF funding), plus \$36.5 million in co-financing, and has a 5 year duration. The PCU is based in Athens. The implementation of the project started this year. UNEP is the implementing agency. Partnering agencies are UNEP-MAP, MEDPOL, SPA/RAC, PAP/RAC, CP/RAC, INFO/RAC, World Bank, UNESCO, UNIDO, FAO, WWF, GWP-MED, and MIO-ECSDE. The objective of the Mediterranean Sea LME Strategic

Partnership is to leverage reforms and catalyze investments that address transboundary pollution reduction and marine and coastal biodiversity conservation priorities identified in the SAPs for the Mediterranean basin. The objective of the proposed UNEP Regional Component is to promote and induce harmonized policy, legal and institutional reforms and fill the knowledge gap aimed at reversing marine and coastal degradation trends and living resources depletion, in accordance with priorities agreed by the countries in the SAP MED and SAP BIO.

Fishing in the LME has increased by about 48% since 1970. Sixty five percent of fish stocks are outside safe biological limits. Mature tuna has fallen by about 80% in the last 20 years. Water access is a problem: water demand doubled during the second half of the 20th century and 108 million people are estimated to be “water poor”, with that estimation increasing to 165 million people by 2025. Aquifers are depleted or polluted in the majority of countries of the southern and eastern Mediterranean. Six hundred and fifty million tons of sewage are discharged untreated into the LME every year, along with 30 million tons of municipal solid waste. There are stockpiles of PCBs remaining in several countries. One hundred and three pollution “hot spots” and 51 sensitive areas have been identified. The main source of phosphorus and nitrogen loading to the LME is agriculture. The detailed TDA has identified the need to reduce unsustainable fishing practices in high priority sites and to reduce the catch of iconic and vulnerable species. Areas under protection are to be increased, e.g. MPAs are planned in Turkey and Algeria. Waste water treatment plants are to be built. By-catch of iconic and vulnerable species is to be specifically reduced by 75% through improved fishing practices and improved public awareness. Biodiversity conservation is to be mainstreamed into fisheries research and management in Morocco, Tunisia, Egypt, Turkey and Croatia. Reports on the project are available at [www.unepmap.org](http://www.unepmap.org). A lot of work is needed to make this project sustainable in the future and there is interest in hearing from the good experiences of other LME projects through an informal conference call. The project is challenging, with the many countries and agencies requiring good coordination. Contacts at the PCU are [Virginie.Hart@unepmap.gr](mailto:Virginie.Hart@unepmap.gr) and [Giorgos.Petridis@unepmap.gr](mailto:Giorgos.Petridis@unepmap.gr).

## **5.0 UN AGENCY PERSPECTIVES ON GEF LME PROJECTS**

### **5.1 The IOC-UNESCO and development of a GEF funded Project**

**Julian Barbrière** described the ongoing development of the Transboundary Water Assessment Programme (TWAP), a systematic and scientifically robust methodology for assessing the changing conditions of five different types of transboundary water systems resulting from human and natural causes, which would allow the policy makers, Global Environment Facility and

international organisations to set science-based priorities for financial resource allocations. The GEF funded Medium Size Project is implemented by UNEP/GEF and will have an 18 months duration. The methodology tracks each of the five categories of transboundary water systems: (i) groundwater; (ii) lakes and reservoirs; (iii) river basins; (iv) LMEs; and (v) open ocean areas. The LME Working Group will focus on transboundary LME 1) productivity, 2) fish and fisheries, 3) pollution and ecosystem health, 4) socioeconomics drivers and 5) governance. The products of the MSP are a methodology report (assessment framework, priority issues, key indicators, institutional framework) and a capacity building needs assessment report.

A large network of partners already exists for LMEs, including IOC-UNESCO (project lead agency), NOAA, GEF/LME projects, LOICZ, GPA, UNEP, Int'l Institute for Applied Systems Analysis, Int'l Centre for Theoretical Physics, Rutgers University, Woods Hole Oceanographic Institute, University of Rhode Island, Princeton University, University of California, UBC Fisheries Centre Sea Around Us project, UNIDO, UNDP, FAO, WMO, GRID Arendal, SAHFOS, IUCN, GESAMP, IMO, OBIS, IMBER, ICES, GLOBEC, CoML, HELCOM, and Regional Seas programmes. The assessments are to be integrated across environmental, economic and social sectors. Coastal systems (mangroves, estuaries, coral reefs, seagrass, river deltas) are to be included in LMEs rather than in river systems. Assessments on the condition of LMEs will be based on changing conditions in productivity, fish and fisheries, pollution and ecosystem health, socioeconomics and governance practices. Key areas or 'polygons' will be defined based on ecological criteria and indicators. The regular Global Marine Assessments would be repeated at intervals of several years. Questions of interest to the LME WG are cross shelf exchange with the open ocean, riverine inputs, groundwater seepage into LMEs, saline intrusion, air-sea fluxes between river basins and LMEs, and impacts of human activities on LMEs. A dialogue will be opened with the Ocean, River Basins, and Groundwater Working Groups. The assessment process will make use of the existing LME scientific network, with support from global, regional, and national sources. The assessment will be linked to existing international ocean data and observation frameworks (e.g. IODE and OBIS) and monitoring systems (e.g. GOOS).

## ***5.2 The FAO supported GEF LME Projects***

**Merete Tandstad**, of FAO, provided an update on the GEF supported Canary Current LME project for which the FAO is the executing agency. The goal of the Canary Current LME project is 'to reverse the degradation of the Canary Current Large Marine Ecosystem caused by over-fishing, habitat modification and changes in water quality by adoption of an ecosystem-based management approach.' The project will enable the countries bordering the Canary Current Large Marine Ecosystem to address priority transboundary concerns on declining fisheries, reductions in biodiversity, and degraded coastal water quality through

governance reforms, investments and management programs'. Component 1 of the project includes specific activities relevant to socioeconomics and to governance. Components 2 and 3 aim to identify and fill knowledge gaps for development of the TDA, and relate to habitat, biodiversity and water quality critical to fisheries. Demonstration projects will address the sustainable, transboundary, ecosystem-based management of shared small pelagic stocks, reduce the impact of shrimp trawling through by-catch reduction and management changes, and introduce actions for recovering and sustaining coastal pelagics of importance to artisanal fisheries. MPAs will be included as a means to recover and sustain demersal artisanal fisheries. A collaborating GEF supported UNEP project will develop a regional mangrove conservation plan, to ensure the conservation of one of the most important fish habitats of the CCLME.

The project received GEF CEO endorsement in 2009. The project document will be sent to the 7 participating countries (Morocco, Mauritania, Senegal, the Gambia, Guinea Bissau, Guinea and Cape Verde) for their signature. The project is expected to begin in November 2009. The Norwegian *Nansen* project has a long history in this region and in Southern Africa and the West Indian Ocean. The objective of the *Nansen* program is to provide the staff of fisheries research institutions and management administrations with additional knowledge of their ecosystems and on the principles of an ecosystems approach to monitoring and management. The *Nansen* program is providing technical assistance to the local institutions in carrying out coordinated *RV Nansen* LME surveys by local research vessels as part of the CCLME project. It draws on the FAO technical guidelines related to the ecosystem approach to fisheries, and aims to build stronger links between science and management in the introduction of ecosystem based management to countries participating in the CCLME project.

### **5.3 The UNIDO supported Guinea Current LME Project**

**Christian Susan**, representing the water management unit of UNIDO, provided an update on the restart of the Guinea Current LME (GCLME) project. The long term development goals of the UNIDO project are to: (1) recover and sustain depleted fisheries; (2) restore degraded habitats; and (3) reduce land and ship-based sources of pollution, through the establishment of an LME management framework for the sustainable use of living and non living resources. The components of the project are to finalize the SAP and develop sustainable financing mechanisms for its implementation, conserve biodiversity, develop strategies for reducing coastal erosion, improve water quality and provide a mechanism for regional coordination and institutional sustainability. The project is funded by the GEF at a level of \$ 21.5 million (including \$ 11.7 million by the UNDP and \$ 9.1 million by UNEP), with co financing from the GCLME countries at a level of \$ 30.4 million. The 5 modules are all represented in the demonstration projects. Those funded by UNEP include a waste stock

exchange management system in Ghana, a project to reduce nutrient discharges in Togo, and Marine Protected Areas in Benin. Those funded by the UNDP include a regional assessment of marine productivity and fisheries, a nypa palm clearance and mangrove restoration project in Nigeria, and low cost protection from coastal erosion in Côte d'Ivoire. An economic valuation of marine goods and services and of the socioeconomic impacts on jobs and livelihoods has been completed for the LME.

The strengths of the GCLME project are its Regional Coordination Unit (RCU) and already established regional working groups. The TDA has been updated, the finalized SAP has been endorsed by the 16 countries of the GCLME and is ready to be adopted by the ministerial meeting, and the Interim Guinea Current Commission has already been established. The work still needing to be done is to create economic tools for SAP implementation, update the legal framework needed to address land based sources of pollution and conserve marine biodiversity, and build human, technical and financial capacity for fisheries regional governance, scientific assessments and management decisions. It is recommended that a ministerial meeting be convened to endorse the pending regional plans and to adopt the measures necessary to complete the project. The RCU needs to be more policy oriented and receive more input from legal, finance and economic experts. The proposed governance structure prescribed by the Abuja Declaration, the Guinea Current Commission, needs to replace the present Interim Guinea Current Commission and find a sustainable source of financing. Another recommendation is to extend project implementation to the end of 2010 at no additional cost to the project, to complete technical evaluations for the projects in Togo, Ghana and Côte D'Ivoire, and prepare a PIF for the second phase of the GCLME Project. This very detailed presentation elicited many comments from the participants on governance issues and institutional linkages. A proliferation of institutions, difficult to sustain at times of economic and financial difficulty, needs to be avoided. Dr. Michael O'Toole, the former Benguela Current LME project manager, said that momentum is important in putting together the second phase of the project and writing a new PIF.

#### ***5.4 The UNDP supported GEF LME Projects***

**Andrew Hudson**, principal technical advisor of GEF UNDP International Waters projects, provided an overview of the TDA and SAP process for GEF funded projects supported by the UNDP. Eighty five percent of the world's 64 LMEs are shared by two or more countries. The GEF strategy is to assist groups of countries to better understand the environmental concerns of their international waters and work collaboratively to address them. The GEF plays a catalytic role in encouraging the use of innovative approaches to the cooperation of countries in managing their transboundary waters. Seventeen LME projects are presently funded by the GEF.

Countries engaged in the GEF LME projects identify and prioritize the transboundary environmental and water resources concerns in a Transboundary Diagnostic Analysis (TDA). In the TDA, countries also examine the socioeconomic impacts and consequences of agreed transboundary problems. In a Strategic Action Programme (SAP), the countries put in place the necessary policy, legal, institutional reforms, investments, and capacity building needed to address the priority issues identified in the TDA. The SAP is a process of reaching political consensus. It requires the best possible scientific and technical advice and is based on the principle of collaborative problem solving. Developing an SAP requires a long term vision for the shared waterbody, and an assessment of the options, including technical feasibility and economic and political impacts. The SAP is a living document that must be periodically re examined. The TDA and SAP process is well aligned with the LME 5 module approach of Productivity, Fish & Fisheries, Pollution & Ecosystem Health, Socioeconomics, and Governance. A TDA/SAP course prepared by GEF agencies to codify experience and best practice is now available for global delivery. A participant's comment raised the issue of the administrative burden of submitting a proposal. Dr. Hudson said that the process had become easier and shorter with the new Project Information Form (PIF) format.

## **6.0 LME METHODOLOGIES**

**Villy Christensen**, of the Fisheries Center of the University of British Columbia, discussed an indicators project of LME conditions for the GEF. The GEF provides funding to eligible developing countries and countries in economic transition across six 'focal areas': biodiversity, international waters, land degradation, climate change, persistent organic pollutants, and ozone depletion. He provided background on the GEF allocation framework of GEF-4, with its focus on biodiversity and climate change. For these two focal areas, GEF resources are to be allocated to countries according to a Resource Allocation Framework (RAF), which responds to each country's potential to generate global environmental benefits. In GEF-5 the RAF may be extended to apply to the remaining four GEF focal areas, including International Waters. If a RAF is applied to the International Waters focal area, key questions would be how to: (a) establish priorities for different types of transboundary waterbodies; (b) determine the country contributions to transboundary benefits for interventions in priority waterbodies; and (c) apportion allocations to countries or another relevant framework. The application of the RAF would also need to respect the long-term strategic objectives of the International Waters focal area which are to: (1) encourage international, multi-state cooperation on priority transboundary water concerns; and (2) catalyze transboundary action addressing these water concerns. Regarding LMEs and LME projects, GEF 5 will examine in which LMEs and in which countries GEF funding will generate greater transboundary water-related benefits and address more vulnerable and urgent situations. It will be necessary to consider which LMEs are overfished; whether the fisheries are

aimed at artisanal communities for food security and livelihoods versus industrial use; the pollution loading status; the habitat value and habitat loss, especially for coral reefs and mangroves, and the impacts of global warming. Examples of best practices in the socioeconomics module are needed.

The purpose of the 10 year *Sea Around Us* project is to make global LME-related databases available including, for IW indicators, a global map of LMEs and open water areas that will display indicators for the global benefits index, including alternative indicators identified from global databases and information systems that are relevant to LMEs. The study will examine data availability and contrast the positive and negative aspects of using 5-6 indicators for each LME, and explore alternative approaches for estimating country contributions to the indicators for each LME. A meeting of the STAP and GEF Secretariat to review International Waters indicators took place in Paris on 3-4 December 2008. It used the five LME modules for identifying indicators of ocean productivity (including impacts of ocean variability and climate change), fish and fisheries, pollution and ecosystem health (including eutrophication and critical habitats e.g. coral reefs, mangroves, seagrass, and coastal wetlands), socioeconomics (including food production and tourism) and governance. Service functions such as those impaired by eutrophication are undervalued in all LMEs. Further actions might consider reprocessing data at a sub-LME scale, e.g. at the country scale for nutrient over-enrichment. Data for fish and fisheries, the category proving most difficult to condense into a small number of indicators, needs to be simplified. Open ocean systems, currently outside the scope of LMEs, need to be examined. Most if not all indicators could be calculated by country. Updating LME data requires regular monitoring and assessments. LME information must be made available globally. Modeling of LMEs can be done at a spatial resolution of  $\frac{1}{2}^{\circ} \times \frac{1}{2}^{\circ}$  for mass-balance (Ecopath), time dynamics (Ecosim), spatial dynamics (Ecospace), projected biomass of benthos, plankton, mesopelagics, marine mammals and birds, fish diversity and growth, primary production, and biomass trends.

**Rashid Sumaila**, from the University of British Columbia (UBC) Fisheries Center, stated that UBC is prepared to examine the broad economic issues relating to LME fisheries during climate change, including mitigation, impacts of climate change on fishing activities in LMEs, adapting fisheries to climate change, and creating adaptive institutions in the face of climate change. How is climate change likely to affect the economic valuation of LMEs? Specifically, how will CC affect the quantity of fish, its distribution and biodiversity, the catch of fish, total revenues, the cost of fishing, and profits from fishing? Fish related jobs contribute to the household income and to the global economy. Scientists at the UBC Fisheries Center have already published a catch, a price, and a small scale fisheries database. They are developing cost of fishing and fishing effort databases, a first version of a database of economic multipliers, as well as

ECOST, an ecological model and a socioeconomic model that are being developed as part of the Ecopath with Ecosim ecological modeling framework.

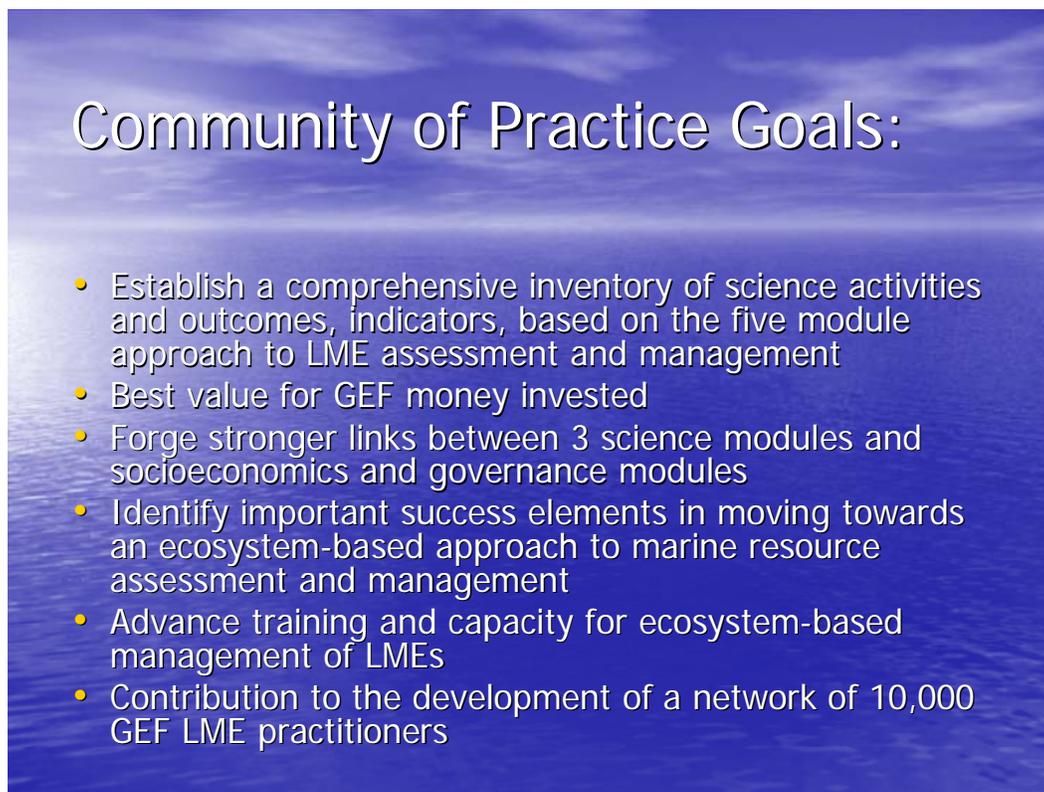
A preliminary study on economic valuation during climate change has been completed for the EEZs of Mexico. It brings ecology and economics together. The database includes commercially exploited fish (63 species), invertebrates (7 species), and shrimp under two climate change scenarios: one mild, with climate forcing agents stabilized, the other severe, with very rapid economic growth, low population growth, moderate use of resources, and a balanced use of technologies. The study covers the climate change impacts on fish biomass distribution, fish catch, fish revenues, and distribution of revenues. Climate change affects water temperature, fish, fish habitats, depth limits, and distance from sea ice. In LMEs it affects catch potential, primary productivity, and the fish range area. Catch distribution, fish landed and fish value is estimated under the two scenarios of climate change. The results for Mexico show a decline for most species except for the California anchovy and sierra. Under the more severe climate change scenario, there is a sharp increase in anchovy and sierra, with the other species in serious decline. For shrimp, the most valuable product in the Mexican EEZ, the change in value is low, even under the more severe climate change scenario. The study on Mexico can be done for each of the LMEs.

## ***7.0 THE GEF COMMUNITY OF PRACTICE FOR LEARNING AND EXPERIENCE SHARING AMONG GEF FUNDED LME PROJECTS AND THE ROLE OF ICES***

**Kenneth Sherman** opened this section of the meeting with a comment that GEF funding was likely to be available in the 5<sup>th</sup> replenishment for initiating a GEF Community of Practice for learning and experience sharing among LME projects. He stated that the LME movement has moved into a new phase that requires further support to the LME projects and a more formalized structure. The success of the LME projects lays the foundation for an LME “Community of Practice” that can share some of the practices that have succeeded and exchange lessons. He estimated that 10,000 LME practitioners are needed to carry the LME work into the future.

**Adi Kellerman**, Head of the Science Programme at ICES, presented on the ICES role in coordinating and promoting marine research on oceanography, the marine environment, marine ecosystems, and living marine resources in the North Atlantic. It is a network of more than 1,600 scientists from 200 institutes engaged in gathering information about marine ecosystems, filling gaps in existing knowledge and providing information and advice that is unbiased and non political. A mission of ICES is also to advance scientific capacity. He discussed a recent reform of the ICES Secretariat. He also discussed the ongoing LME movement and how its scientific needs might be met.

**Marie-Christine Aquarone** provided background on the history of the LME movement and the need for LME practitioners to exchange lessons and practices that have worked in LME projects. Examples of projects that already provide a wealth of practices are the Benguela Current and Yellow Sea LME projects. She discussed several community of practice goals, including: (i) the establishment of an inventory of metrics, activities, and outcomes for each of the 5 LME modules; (ii) the forging of stronger links between science-based modules and the socioeconomics and governance modules; and (iii) the establishment of a network of 10,000 GEF LME practitioners. Community of practice goals are summarized in **Figure 1**.



**Figure 1.** Goals of the GEF Community of Practice for Learning and Experience Sharing among GEF-funded LME projects.

**Jan Thulin**, Senior Advisor at ICES, commented that both ICES and HELCOM had been driving forces of the Baltic Sea LME Project from the time of its inception. ICES has extensive experience in applying ecosystem based management in relation to the LME concept. It is a unique and important source of scientific information and advice for LME activities and funded LME projects. The time has come to exchange knowledge with LME projects that are more

advanced along the track, and avoid duplication of efforts. He stated that ICES would be a good vehicle for the development of best practices.

**Gotthilf Hempel** outlined the necessary steps toward a global community of practice for learning and experience sharing among GEF funded LME projects and offered his support for the establishment of the global community of practice within a working group of ICES.

In the ensuing discussion several participants welcomed the idea and thought it was timely. The terms of reference of an ICES Working Group would need to be drafted and discussed. Michael O'Toole noted there was presently a gap between the fishermen and the country ministers that could be bridged through the proposed Community of Practice. Representatives of the UN agencies said it would be necessary to explore how the Community of Practice would benefit the LME projects. It was decided that the LME Consultative Committee would pursue the idea and draft the terms of reference for a proposed LME Community of Practice Working Group within ICES.

The powerpoint presentations for the meeting are available on the IOC FTP site <ftp://ioc.unesco.org> (User: iocftp, Password: prephost).

ANNEXES

I. AGENDA

**IOC-IUCN-NOAA Large Marine Ecosystem  
11<sup>th</sup> Consultative Committee Meeting  
Paris, FRANCE  
9-10 July 2009  
A G E N D A**

DAY 1 - July 9, 2009

TIME	TOPIC	SPEAKER
9:00 am - 12:00 pm	IOC Welcome	Patricio Bernal Luis Valdes
	Report from IUCN Barcelona Congress; Joint IUCN/NOAA LME Outreach	Carl Gustaf Lundin
10:00 am - 10:15 am	<b>COFFEE/TEA</b>	
	<b>LME PROJECT STATUS</b>	
	Indicators of Changing States of Large Marine Ecosystems During Climate Change	Kenneth Sherman
	Agulhas & Somali Currents LME Project Report; West Indian Ocean Cruise; Towards a Long-Term Monitoring & Early Warning Mechanism for Ecosystem & Climate Variability	David Vousden
	Agulhas & Somali Currents LME Linkages to Adjacent Western Indian Ocean Seamounts During Climate Change	Sarah Gotheil
	Benguela Current LME Project Summary & Replicability of Best Practices in Relation to Other GEF LME Projects	Hashali Hamukuaya Michael O'Toole
	Gulf of Mexico LME Project Update	Porfirio Alvarez Antonio Diaz de Leon
12:00 pm - 1:00 pm	<b>LUNCH</b>	
1:00 pm - 5:00 pm	Changing States of the Yellow Sea LME: Anthropogenic Forcing and Climate Impacts	Qisheng Tang
	The Ecosystem-Based Approach in the Yellow Sea LME Strategic Action Program (SAP)	Mark Walton
	Status Report on the Bay of Bengal LME	Simon Funge-Smith Chris O'Brien
3:00 pm - 3:15 pm	<b>COFFEE/TEA</b>	

**11<sup>th</sup> Consultative Committee Meeting - Paris 9-10 July 2009 (cont'd)**

TIME	TOPIC	SPEAKER
	<b>ARTIC &amp; ANTARCTIC ACTIVITIES (cont'd)</b>	
	Climate Change Indicators of Ecological Conditions in the West Bering Sea & Barents Sea LMEs	Gennady Matishov
	Sustainability of the Baltic Sea LME Under Conditions of Climate Warming	Jan Thulin
<b>5:00 pm</b>	<b>ADJOURN</b>	

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**DAY 2 - July 10, 2009**

| TIME                       | TOPIC                                                                                 | SPEAKER           |
|----------------------------|---------------------------------------------------------------------------------------|-------------------|
|                            | <b>LME PROJECT STATUS &amp; NEW PROJECTS (cont'd)</b>                                 |                   |
| <b>9:00 am - 12:00 pm</b>  | Initiation of the Caribbean Sea LME Project                                           | Martin Johnston   |
|                            | FAO Overview of Canary Current Project                                                | Merete Tandstad   |
|                            | Restart of the Guinea Current LME Project                                             | Christian Susan   |
|                            | UNEP GEF Mediterranean LME Project                                                    | Virginie Hart     |
|                            | <b>5-MODULE METHODOLOGY</b>                                                           |                   |
|                            | UNDP Overview of GEF LME Projects                                                     | Andrew Hudson     |
| <b>10:00 am - 10:15 am</b> | <b>COFFEE/TEA</b>                                                                     |                   |
|                            | Indicators of LME Condition for the GEF                                               | Villy Christensen |
|                            | Economic Valuation of LME During Climate Change                                       | Rashid Sumaila    |
|                            | <b>GEF LME COMMUNITY OF PRACTICE</b>                                                  |                   |
|                            | LME Projects & GOOS & GEOSS in Africa                                                 | Justin Ahanhanzo  |
|                            | The GEF International Transboundary Waters Assessment Methodology Medium Size Project | Julian Barbieri   |
| <b>12:00 pm - 1:00 pm</b>  | <b>LUNCH</b>                                                                          |                   |

**11<sup>th</sup> Consultative Committee Meeting - Paris 9-10 July 2009 (cont'd)**

| <b>TIME</b>              | <b>TOPIC</b>                                                                                                      | <b>SPEAKER</b>                                     |
|--------------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| <b>1:00 pm - 5:00 pm</b> | Overview of the Approach to LME Project Best Practices & Training                                                 | Kenneth Sherman<br>Marie-Christine Aquarone        |
|                          | Global GEF Community of Practice for Learning & Experience Sharing Among GEF-Funded LME Projects and Role of ICES | Jan Thulin,<br>Gotthilf Hempel,<br>Adi Kellermann, |
| <b>3:30 pm - 3:45 pm</b> | <b>COFFEE/TEA</b>                                                                                                 |                                                    |
|                          | Discussion on Community of Practice                                                                               | ALL                                                |
|                          | Roundtable Discussion/Planning Session 2009-2010, Including New GEF Supported LME Projects                        | ALL                                                |
| <b>5:00 pm</b>           | <b>ADJOURN</b>                                                                                                    |                                                    |

## ANNEX II – LIST OF PARTICIPANTS

IOC/UNESCO-IUCN-NOAA Large Marine Ecosystem  
11<sup>th</sup> Consultative Committee Meeting  
9 -10 July 2009 - Paris, FRANCE

### Participant Contact List

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