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# International Waters

– Delivering Results



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**Cover photo:** ARC Centre of Excellence for Coral Reef Studies/Marine Photobank © A fishing closure in a sustainably managed coral reef system in Papua New Guinea ends with a harvest for a traditional feast.

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# International Waters

## – Delivering Results



# CONTENTS

Foreword	2
Introduction	4
UNDP-GEF International Waters Portfolio – Cumulative Results Tracker 1991–2012	7
UNDP-GEF International Waters Portfolio By The Numbers	8
 Large Marine Ecosystems	9
<b>Africa</b>	
Guinea Current Large Marine Ecosystem (GCLME) Project	10
Agulhas and Somali Current Large Marine Ecosystems (ASCLME) Project	14
Implementation of the Benguela Current Large Marine Ecosystem (BCLME) Strategic Action Programme	16
Ecosystem-based Approach to Fisheries Management – Seamounts in the Southern Indian Ocean	18
<b>Asia and Pacific</b>	
Reducing Environmental Stress in the Yellow Sea Large Marine Ecosystem	20
Arafura and Timor Seas Ecosystem Action Programme (ATSEA)	22
Pacific Islands Oceanic Fisheries Management Project (OFMP)	24
 Transboundary Rivers, Lakes and Aquifers	27
<b>Africa</b>	
Environmental Protection and Sustainable Management of the Cubango–Okavango River Basin (EPSMO)	28
Reversing Land and Water Degradation Trends in the Niger River Basin	30
Orange–Senqu River Basin Strategic Action Programme	32
Implementation of the Lake Tanganyika Strategic Action Programme	34
Reversal of Land and Water Degradation in Lake Chad Basin	36
Senegal River Basin Water and Environmental Management Project	38

<b>Arab States</b>	
Development of a Strategic Action Programme for the Nubian Shared Aquifer System	40
<b>Europe and CIS</b>	
Implementation of the Dnipro River Basin Strategic Action Programme	42
Integrating Multiple Benefits of Wetlands and Floodplains into Management of the Tisza River Basin	44
The Caspian Sea: Restoring Depleted Fisheries and Consolidation of a Permanent Regional Environmental Governance Framework (CaspEco)	46
<b>Latin America and Caribbean</b>	
Implementation of the Rio de la Plata/Maritime Front Strategic Action Programme	50
 <b>Integrated Water Resources and Coastal Area Management</b>	<b>53</b>
<b>Asia and Pacific</b>	
Implementing Sustainable Water Resources and Wastewater Management in Pacific Island Countries	54
Implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA)	56
<b>Latin America and Caribbean</b>	
Integrating Watershed and Coastal Area Management in Caribbean Small Island Developing States (IWCAM)	60
Reducing Hypoxia and Eutrophication in Havana Bay through Innovative Approaches	64
 <b>Global</b>	<b>67</b>
Global Ballast Water Management Programme (GloBallast)	68
GEF IW:LEARN: Strengthening International Waters Portfolio Delivery and Impact	70
<b>Acronyms and Abbreviations</b>	<b>73</b>

# FOREWORD



YANNICK GLEMAREC

The earth's water and ocean ecosystems provide mankind with a wide range of both market and non-market ecosystem services, including food, drinking water, recreation, transport, energy resources, minerals, climate regulation, etc. Billions of people depend on healthy marine and freshwater systems for their livelihoods and security. These vital ecosystems face a range of threats to their integrity, including pollution, overfishing, unsustainable water use, invasive species, habitat loss, and impacts from climate change such as ocean acidification. Despite numerous international commitments, the majority of these threats continue to increase at a geometric rate, underscoring the urgency for taking immediate action to reduce stress on these ecosystems and permit their recovery.

The majority of the earth's major freshwater and ocean ecosystems straddle the boundaries of two or more nations, underscoring the need for cooperative approaches among the countries sharing such resources. For over twenty years, UNDP-GEF's International Waters programme has been supporting groups of countries in their joint efforts to sustain the critical market and non-market ecosystem services provided by many of the world's most significant transboundary lakes, rivers, aquifers and Large Marine Ecosystems (LME). To date, UNDP-GEF has supported over 100 countries in efforts to sustainably manage 13 LMEs, 10 river basins, 6 lakes and 2 aquifers.

UNDP-GEF has developed and applied a series of strategic planning methodologies that have proven highly effective not only at facilitating regional and national governance reform to improve management of these transboundary systems, but, in many cases, at catalysing sizeable quantities of public and private finance to address priority transboundary issues. These instruments include the GEF's Transboundary

Diagnostic Analysis/Strategic Action Programme process, Integrated Coastal and Water Resources Management, and building on regional and global legal frameworks. Each approach follows a similar overall process of prioritising water or ocean issues, identifying barriers to sustainable use, determining appropriate mixes of policy instruments to remove barriers, and implementing agreed reforms and investments.

This publication highlights UNDP-GEF International Waters portfolio results achieved across four UNDP-GEF 'signature' programmes: Large Marine Ecosystems; Transboundary Lakes, Rivers and Aquifers; Integrated Water Resources and Coastal Area Management; and Global Programmes. A series of project case studies review delivery of results in the context of the GEF International Waters focal area's Results Indicators framework – Process, Stress Reduction and Environmental and Socioeconomic Status Results. The publication also includes an overview of cumulative results delivery across the entire UNDP-GEF International Waters portfolio since 1991.

*International Waters – Delivering Results 2012* clearly demonstrates how a series of proven strategic planning instruments can be used to deliver both the governance reforms and investments needed to reverse the degradation of the world's principal transboundary water systems. These methodologies are not only effective but are highly replicable and scalable, underscoring the importance of continued GEF and partner investment in sustaining the world's critical water and ocean systems if we are to move towards a truly sustainable pathway.



**Yannick Glemarec**  
UNDP-GEF Executive Coordinator

# INTRODUCTION



*Benner Bay Mangrove Lagoon Marine Sanctuary, St. Thomas. © Katie Fuller 2009/Marine Photobank.*

**T**ransboundary freshwater and ocean ecosystems are the norm, not the exception. Globally, there are 263 watersheds that cross the political boundaries of two or more countries; these watersheds represent about one half of the earth's land surface and 40% of global population. Around 55% the world's 64 Large Marine Ecosystems (LME) are shared by two or more countries. As a result, multi-country cooperation on the management of shared water and ocean ecosystems is essential if sustainable, integrated and ecosystem-based management of these vital ecosystems is to be achieved. The benefits that can be realised through multi-state cooperation on water and oceans go 'beyond the shared waters' and include increased regional cooperation, economic integration and investment, and enhanced trust, peace and security.

Since 1991, UNDP-GEF's International Waters Programme has been supporting over one hundred countries that share some of the world's largest and most important aquatic ecosystems to work cooperatively in addressing the agreed priority environmental and water resource concerns facing such waterbodies. UNDP-GEF's International Waters portfolio is divided across four 'signature' programme areas:

- Large Marine Ecosystems
- Lakes, Rivers and Aquifers
- Integrated Water Resources and Coastal Area Management
- Global Programmes

The first two programme areas have consistently applied the GEF's "Transboundary Diagnostic Analysis/Strategic Action Programme" methodology as a strategic planning tool to facilitate regional and national governance reform and investments to address agreed priority transboundary concerns. The case studies in these sections highlight the results of the TDA/SAP processes in each waterbody in delivering multi-country agreement on priorities and required actions; some projects have reached the stage of completing the TDA/SAP process whereas others are already in the stage of implementing reforms and investments agreed under the SAP.



The third area focuses on programmes which have successfully applied two core water and coastal planning methodologies – Integrated Water Resources Management (IWRM) and Integrated Coastal Management (ICM). In the special case of Small Island Developing States (SIDS), where the linkages between upstream watershed management and coastal area protection are particularly evident, IWRM and ICM are increasingly being combined into a single, coherent planning instrument – Integrating Watershed and Coastal Area Management (IWCAM) – with the Caribbean region leading the effort.

Some of the challenges facing the earth's aquatic ecosystems, particularly the oceans, are truly 'global' in nature and require a global response. These include persistent organic pollutants, certain heavy metals, ocean acidification, marine plastics pollution, pollution from ships, and marine invasive species. UNDP-GEF's fourth signature programme area has included projects addressing global mercury pollution (from artisanal gold mining, one of the largest sources) and programmes targeting reducing the risks from invasive species carried in ship's ballast water. The latter programme, GloBallast, is highlighted in the last section (Global) of *International Waters - Delivering Results*. Lastly, the GEF International Waters focal area has consistently taken steps to promote portfolio-wide learning through a number of projects and other initiatives. For the last 15 years, the GEF's preeminent programme in this area has been IW:LEARN, the International Waters Learning Exchange and Resources Network, and UNDP has consistently played a leading role in the interagency IW:LEARN effort. IW:LEARN's cumulative results in the area of portfolio learning are highlighted in the Global Programmes section.

Each project case study in *International Waters - Delivering Results* is broken into three sections: Project Context, Threats and Causes, and Results Delivered - Process, Stress Reduction, and Environmental and Socioeconomic Status. The 'Threats and Causes' section summarises the priority transboundary issues faced by each waterbody and the main barriers or root causes behind each issue as determined through the TDA process. The GEF International Waters focal area has adopted 'Process, Stress Reduction, and Environmental and Socioeconomic Status' as its core results indicators for project and portfolio level monitoring. These results indicators are defined as follows:

## Process Results

Process results are outcomes and associated indicators which establish regional and/or national frameworks/conditions for improving transboundary environmental/water resources quality or quantity but do not in and of themselves deliver stress reduction or improved transboundary environmental/water resources quality or quantity (e.g. reformed legislation does not reduce stress or improve the waters environment until it is actually implemented/enforced). Most GEF TDA/SAP formulation (Foundational/Capacity Building) projects deliver principally Process Results in the form of approved TDAs and adopted SAPs, as do Portfolio Learning (knowledge sharing, best practices, lessons learned) projects.

## Stress Reduction Results

Stress Reduction results are outcomes and associated indicators which characterise and quantify specific reductions in environmental/water resources stress on transboundary water bodies, e.g. reduction in pollutant releases, more sustainable fishing levels and/or practices, improved freshwater flows, reduced rate of introduction of invasive species, increased habitat restoration or protection, etc. In GEF project context, Stress Reduction results are usually delivered through either SAP implementation projects (including Strategic Partnerships/Investment Funds) or Demonstration projects and/or demonstration project components of SAP projects. Since projects are seeking to establish evidence for stress reduction (= change in stress), stress reduction indicators ideally need to be measured and reported against a baseline level and year.

## Environmental and Socioeconomic Status Results

Environmental and Socioeconomic Status (ESS) results are outcomes and associated indicators which demonstrate improvements in the environmental/water resources status of transboundary waterbodies as well as any associated socioeconomic improvements. These indicators are usually 'static' snapshots of environmental (e.g. pollution levels, fish stock biomass, areas of habitat, etc.) and socioeconomic conditions (e.g. wages, employment levels, measures of human health, etc.) at a given point in time so, like Stress Reduction, are ideally reported against a baseline year and level to show change/improvement. GEF International Waters projects would not usually report ESS Status Outcomes and Indicators until the projects reach the SAP implementation stage (but an important *Process Outcome* within a SAP

formulation project would be multi-country agreement on a suite of ESS Outcomes and Indicators and the necessary mechanisms to measure and report them).

Cumulative progress on results delivery across the entire UNDP-GEF International Waters Portfolio is summarised in Cumulative Results Tracker table on page 7 which, drawing from the GEF International Waters focal area's 'Tracking Tool', consolidates progress made in 31 transboundary waterbodies for each of the GEF's key process, stress reduction and environmental and socioeconomic status result areas. This table clearly demonstrates the global impact of the portfolio in advancing multi-country cooperation for sustainable management of many of the world's most significant shared freshwater and ocean systems.

Cumulative UNDP-GEF programming in the International waters focal area is summarised in the figures on page 8, UNDP-GEF International Waters Portfolio - By the Numbers. A total of \$454 million in GEF grant resources has been programmed covering all regions, waterbodies and signature programme areas.

*International Waters – Delivering Results* underscores a number of important lessons that need to be recognised in new and continuing efforts to advance multi-country cooperation to sustain the earth's critical transboundary waters systems. These include:

- A majority of the world's aquatic ecosystems, both freshwater and marine, are transboundary in nature and therefore require multi-country approaches to achieve effective environmental governance;
- The long time frames – typically 15-20 or more years – required to facilitate multi-country governance reforms and investments aimed at restoring or protecting large, transboundary waters systems;

- The effectiveness of a series of proven methodologies and approaches – (TDA/SAP), (ICM/IWRM), and building on regional and global legal frameworks – in advancing transboundary waters management; these instruments are both replicable and scalable;
- The value of combining these methodologies into integrated programs that simultaneously apply 'top-down' (TDA/SAP) and 'bottom-up' (ICM/IWRM) approaches to sustainable management of large scale aquatic ecosystems;
- The importance of linking management of coastal and ocean ecosystems with their linked freshwater drainage basins via 'ridge to reef' or 'basin-wide' approaches;
- The vital importance of building partnerships – with governments, regional waterbody organizations, UN agencies, international financial institutions, NGOs, academia and the private sector – to achieve key objectives in sustaining the world's transboundary waters systems.

*International Waters – Delivering Results* is the fourth (since 2002) in a series of knowledge publications prepared by the UNDP-GEF International Waters programme that document and highlight key results and achievements at the project and portfolio level. UNDP-GEF looks forward to future editions of *International Waters – Delivering Results* as the portfolio continues to make progress in sustaining the world's most significant shared water systems for the billions of people who depend on these ecosystems for their livelihoods and security.

**Andrew Hudson**  
Principal Technical Adviser  
International Waters  
UNDP-GEF



Alexander Bay, Northern Cape, South Africa. March 2, 2012.

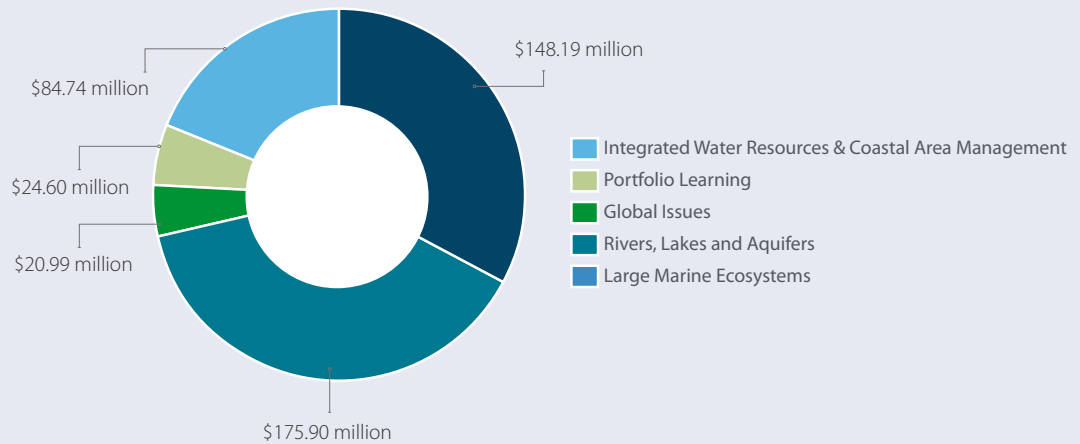
# UNDP-GEF INTERNATIONAL WATERS PORTFOLIO – CUMULATIVE RESULTS TRACKER 1991-2012

Transboundary Waterbody	Multi-country agreement on priority transboundary issues and root causes (TDA/equiv)	National inter-sectoral coordination mechanisms established	Multi-country agreement on governance reforms to address priority transboundary issues (SAP/equiv)	Regional transboundary waters legal agreement in force	Regional transboundary waters management institution in place	Implementation of stress reduction measures underway (SAP/equiv implementation)	Measurable environmental and/or socioeconomic status improvements
<b>Large Marine Ecosystems</b>							
Benguela Current LME	√	√	√		√	√	
Black Sea LME	√	√	√	√	√	√	√
Caribbean Sea LME	√	√					
Guinea Current LME	√	√	√		√	√	
Humboldt Current LME							
W/C Pacific Ocean	√	√	√	√	√	√	√
East Asian Seas	√	√	√		√	√	√
Sulu-Celebes Sea LME	√	√					
Timor-Arafura Seas	√	√					
Agulhas/Somali Current LMEs							
Yellow Sea LME	√	√	√			√	√
Red Sea LME	√	√	√	√	√	√	
Rio de la Plata/MF	√	√	√	√	√	√	
<b>Transboundary Rivers</b>							
Artibonite River basin		√					
Danube River basin	√	√	√	√	√	√	√
Dnipro River basin	√	√	√			√	
Kura River basin	√	√					
Niger River basin	√	√	√	√	√	√	
Nile River basin	√	√	√		√	√	
Senegal River basin	√	√	√	√	√	√	
Orange/Sengu River basin	√				√		
Okavango River basin	√	√	√	√	√		
Tisza River basin	√	√	√	√	√	√	
<b>Transboundary Lakes</b>							
Lake Chad	√	√	√	√	√	√	
Lake Prespa	√	√	√	√	√	√	
Lake Baikal							
Lake Tanganyika	√	√	√	√	√	√	√
Lake Peipsi	√	√	√	√	√	√	
Caspian Sea	√	√	√	√	√	√	√
<b>Transboundary Aquifers</b>							
Dinaric Karst Aquifer	√						
Nubian Sandstone Aquifer	√	√	√	√	√	√	

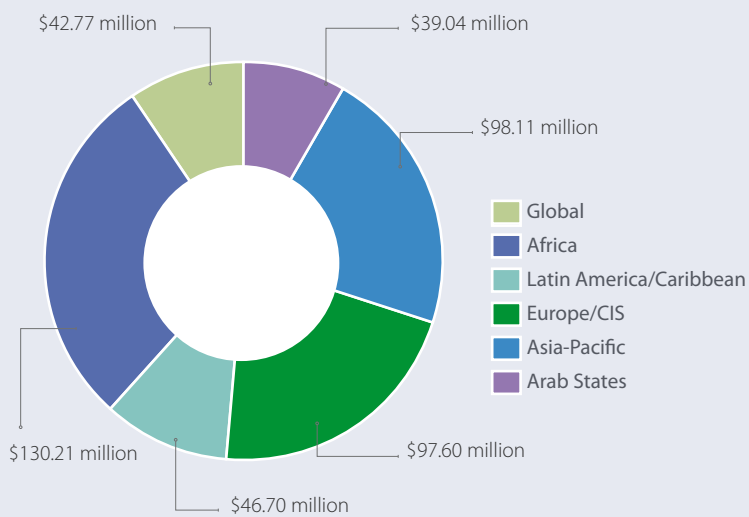
√ = result preceded GEF intervention

# UNDP-GEF INTERNATIONAL WATERS PORTFOLIO BY THE NUMBERS

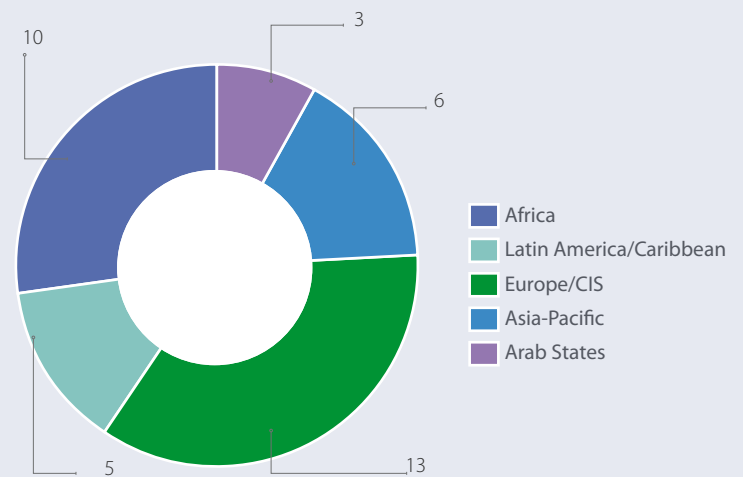
## Cumulative GEF Grants by Programme Area (US\$ millions)



## Cumulative GEF Grants by Region (US\$ millions)



## Cumulative Number of Transboundary Waterbodies



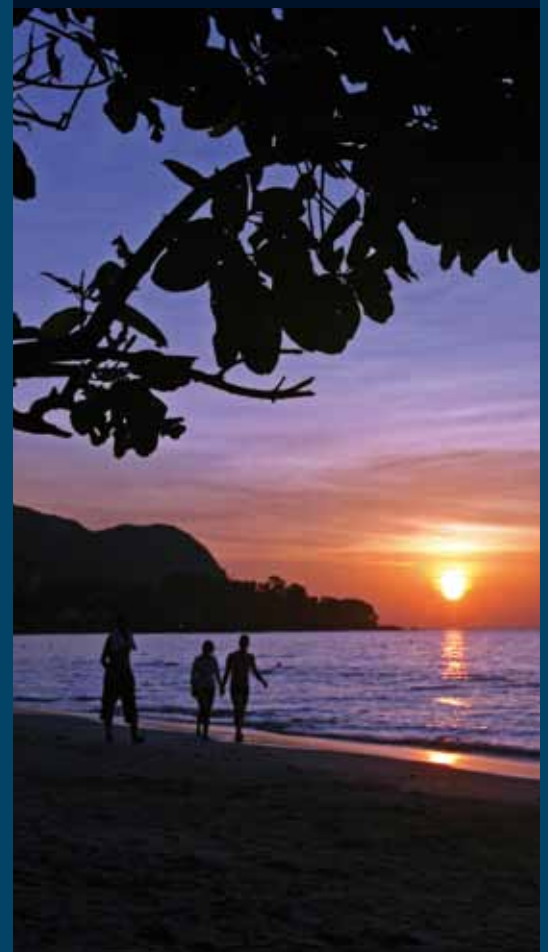

Large Marine Ecosystems (LMEs) are relatively large areas of ocean space of approximately 200,000 km<sup>2</sup> or greater, adjacent to the continents in coastal waters where primary productivity is generally higher than in open ocean areas. The physical extent of an LME and its boundaries is based on four linked ecological, rather than political or economic, criteria: (i) bathymetry (depth), (ii) hydrography, (iii) productivity, and (iv) trophic relationships. The world's 64 LMEs produce about 80% of the annual world's marine fisheries catch and contribute an estimated \$12.6 trillion in (non-market) goods and services annually to the world's economy. Around 55% of the world's 64 LMEs are shared ecosystems in that they are bordered by two or more countries. This underscores the need to take cooperative, multi-country approaches to achieve truly sustainable, ecosystem-based management of critical LME goods and services.

Due to their proximity to the continents and the sizeable fraction of the human population that lives near the coasts, LMEs are hot spots of coastal ocean pollution and nutrient over-enrichment, habitat degradation, overfishing, invasive species, biodiversity loss, and climate change effects. As a consequence of climate change, 62 of the world's 64 LMEs show a recent warming trend and more than one-quarter of the planet's LMEs are warming at a very fast rate; this is already forcing fish stocks to move, often to cooler waters in nearby countries, representing a direct threat to food, livelihoods and national security for some coastal communities. Climate driven warming of ocean surface waters is also leading to increased ocean stratification, particularly in temperate and tropical regions often highly dependant on marine resources for sustenance and livelihoods. This stratification reduces the upwelling of deep, nutrient-rich ocean waters which can reduce ocean primary productivity (plankton growth) and associated biomass production in higher trophic level ecosystems (including fisheries) that ultimately depend on these nutrient supplies.

Increasingly, the concept of linking management of larger scale coastal and marine ecosystems such as LMEs to similar efforts in the large river systems that drain to these coastal areas is being applied. Such 'basin-wide' approaches have been pursued including through linked UNDP-GEF LME and river basin programmes such as the Danube River and Black Sea, the Yellow Sea LME and its drainage area, and through the Sustainable Development Strategy for the Seas of East Asia.

UNDP-GEF has been supporting and applying the LME approach to regional ocean governance since the GEF Council adopted LMEs as an appropriate biogeographic management framework in the 1995 GEF Operational Strategy. UNDP has been involved as a GEF Agency in 13 of the 21 LMEs GEF supports and has cumulatively programmed \$148 million in GEF International Waters funding towards these LME management programmes, supporting over 100 countries. In each of the LMEs it supports, UNDP-GEF has applied the GEF's Transboundary Diagnostic Analysis/Strategic Action Programme (TDA/SAP) methodology for issue prioritisation, causal chain analysis and multi-country agreement on required governance reforms and investments. Chapter 1 highlights key results delivered to date in seven of these LME programmes.

# Large Marine Ecosystems



# Guinea Current Large Marine Ecosystem (GCLME) Project



Phosphate and cadmium-rich effluents from the Kpeme phosphate mine.

## INFORMATION BOX

**Scope:** Regional

**Countries:** Angola, Benin, Cameroon, Congo, Cote d'Ivoire, Democratic Republic of Congo, Gabon, Ghana, Equatorial Guinea, Guinea, Guinea Bissau, Liberia, Nigeria, Sao Tome & Principe, Sierra Leone and Togo

**Partners:** GEF, UNEP, UNIDO, FAO, IMO, US NOAA, Interim Guinea Current Commission, IPIECA

**GEF Grants:** \$27.449 million

**Co-Finance:** \$34.384 million

**Project Cost:** \$61.833 million

**Project website:** [www.gclme.org](http://www.gclme.org)

## Project Context

The project has been designed to address the priority problems identified by the 16 GCLME countries that have led to unsustainable fisheries and use of other marine resources, as well as the degradation of marine and coastal ecosystems by human activities. The long-term development goals of the project are: 1) recover and sustain depleted fisheries; 2) restore degraded habitats; and 3) reduce land and ship-based pollution, by establishing a regional management framework for sustainable use of living and non-living resources in the GCLME. The project has five main components with associated objectives identified by the root cause analysis carried out during the project preparation process: i) Finalise the Strategic Action Programme (SAP) and develop a sustainable financing mechanism for its implementation; ii) Recovery and sustainability of depleted fisheries and living marine resources including mariculture; iii) Planning for biodiversity conservation, restoration of degraded habitats and developing strategies for reducing coastal erosion; iv) Reduce land and sea-based pollution and improve water quality; and v) Regional coordination and institutional sustainability including the establishment of a Guinea Current Commission.

## Threats and Causes

As identified by the Transboundary Diagnostic Analysis (TDA), the main threats to the GCLME include: the decline of commercial and artisanal fish stocks and non-optimal harvesting of living resources; uncertainty regarding ecosystem status and yields including effects of global climate change; deterioration in water quality, as a result of pollution from land and sea based activities (for example the rapidly emerging Oil & Gas sector), resulting in eutrophication and harmful algal blooms; and habitat destruction and alteration, coastal zone degradation, coastline erosion and loss of biotic (ecosystem) integrity. Underlying root causes of these threats include: complexity of the ecosystem with a high degree of variability (resources and environment); inadequate capacity development (human and infrastructure); poor legal frameworks at national and regional levels; inadequate implementation of available regulatory instruments; inadequate planning at all levels; insufficient public involvement; inadequate financial mechanisms and financial support; and poverty.

## Results Delivered

### Process Results

The TDA was completed in 2006 and disseminated to all stakeholders. The SAP was completed and endorsed by all 16 governments in 2007. The development of National Action Plans (NAPs) was completed in early 2011. In addition,

the development of National Programmes of Action for the Protection of the Marine Environment from Land-based Activities (NPA-LBAs) was completed and validated in all 16 GCLME countries. At the national level, 16 project coordination structures are in place and fully functional as well as 16 national Inter-Ministerial Committees (IMC).

With the establishment of the Interim Guinea Current Commission (IGCC) and the ministerial decision to establish a permanent Guinea Current Commission (GCC), the institutional structure for the sustainable management of the GCLME's living and non-living natural resources has been established. A fully functional Regional Coordination Unit supports regional consultation and joint actions and serves as the Executive Secretary to the Interim Guinea Current Commission. A draft treaty for the establishment of the Guinea Current Commission has been prepared and inter-agency proposals for intergovernmental consultations on the best institutional set-up for the establishment of the Guinea Current Commission will be presented to the IGCC member states in May 2012 for discussion and decision making by the Ministerial Committee.

Under the Regional Demonstration Project on Productivity, the GCLME's carrying capacity was assessed and under the Regional Demonstration Project on Fisheries, the status of dominant demersal and pelagic fish stocks was assessed in close collaboration with FAO. The results were used to demonstrate to the GCLME countries the impacts that management interventions will have on the recovery of their fish stocks. In several training sessions, capacity for the development of management plans was built and the development of action plans for the conservation and management of shared stocks was facilitated.

- » The GCLME is a Class I, highly productive ecosystem with average annual primary productivity of over 300 gC/m<sup>2</sup>/year;
- » Recent fish landings in the GCLME average close to 1 million mt/year with landed value approaching \$1 billion;
- » The majority of the catch is taken from stocks considered fully exploited;
- » An estimated 4 million tonnes of waste oil are discharged annually into the LME from the Niger Delta region;
- » Approximately 40% of the GCLME region's 350 million people live in the coastal area of the GCLME;
- » The economic value of environmental and social services provided by healthy ecosystems in the GCLME amounts conservatively to between \$13 and \$17 billion per annum;
- » Lagos, Nigeria and Monrovia, Liberia are projected to be amongst the world's 10 cities most affected by climate change induced sea level rise.

In cooperation with the International Maritime Organization (IMO), the identification of invasive species introduced through ballast water and the elaboration of recommendations for the necessary amendments of national laws and regulations with regards to biodiversity and introduced species was facilitated. Further, Regional capacity for Oil Spill Contingency Planning has been built including the standardisation of oil dispersant usage in collaboration with IMO and the private sector organization, IPIECA. The GCLME project also facilitated the development of the Emergency Protocol of the Abidjan Convention in close cooperation with



*Oil Spill containment - Democratic Republic of the Congo.*

IMO and UNEP. This Protocol was adopted by the 9th COP of the Abidjan Convention.

### Stress Reduction Results

The National Demonstration Project in Togo identified an appropriate solution to reduce water pollution with transboundary significance from a nationally strategic industrial point source. Low cost technologies to treat phosphate and cadmium-rich effluents (up to 100,000 m<sup>3</sup>/day) from the phosphate factory in Kpémé were identified, tender documents and Bill of Quantities (BOQs) for the implementation were developed, and a sludge management concept was elaborated.

Under the National Demonstration Project for Benin, technical assistance was provided for the participatory process to establish and develop management plans for four Marine Protected Areas with a total surface of 27,020 ha. Critical lessons learned were disseminated to all 16 GCLME countries through an onsite participatory workshop.

Ghana's National Demonstration Project on the establishment of a waste stock exchange management system resulted in initiatives for the recycling of 80,000 mt/year of waste oil and 12,000 mt/year of plastic by the private sector. This best practice to involve the private sector was disseminated through a Regional Private Sector Roundtable which spawned a Regional Network for Waste Management comprising private sector companies from 7 GCLME states.

In Nigeria (Cross River Estuary), the Nypa palm/mangrove project demonstrated how the conjunctive management of Nypa palms and mangroves can reduce the dominance of Nypa palms and thereby restore threatened native mangroves.

The Cote d'Ivoire (Assinie beach) project demonstrated how coastal erosion can be reduced by low cost technology, and how environmental and social impacts have to be taken into consideration when planning coastal erosion defense measures.

The Cameroon Demonstration Project on Integrated Coastal Area Management (ICAM) was successful and the results have been utilised in the Spatial Planning for the Kribi –Campo district including successful micro projects on tourism promotion, household shrimp cultivation and marketing, combination of aquaculture with poultry farming, reuse of engine oils, and income generation from mushroom cultivation by local women groups. The results from this Demo project have been integrated into the Cameroon NAP and has attracted funding from bilateral partners and UN agencies such as FAO.

### Environmental and Socioeconomic Status Results

Stress reduction delivered through the Ghana waste stock exchange demonstration will translate into reduced oil levels and marine debris pollution in this region of the GCLME. Similarly, once implemented, the Togo phosphate/cadmium pollution reduction technology will reduce levels of phosphate and cadmium pollution in GCLME waters adjacent to this hotspot up to the coastal waters of Benin and Nigeria. The Benin MPA demonstrations will deliver 27,020 ha of new protected areas with associated enhancements in fish biomass, trophic indices, and fishing-related livelihoods. The Nigeria nypa palm/mangrove demonstration aims to deliver a net increase in mangrove area of 300 ha on Uko Ntense Island (Tobacco Island) in the Akwa Ibom state in the Niger delta with associated benefits including enhanced coastal nutrient and sediment sinks, increased habitat for fish and other biodiversity, and increased coastal protection from storm surges. The Integrated Coastal Area Management (ICAM) demonstration in Kribi, Cameroon will improve tourism incomes and infrastructure, and improve gender balance in the local community by providing innovative avenues for income generation by women in the area as well as household food security for the villages.

An innovative assessment of the Social and Economic Value of Ecosystem Goods and Services for the whole GCLME regions was undertaken and the value was conservatively estimated at between 13 and 17 billion US dollars per annum. This study has been published as the "The Economic and Social Value of Ecosystem Goods and Services for the GCLME Region: A First Approximation." It serves as a baseline for future valuation work by the GCLME Economic and Social Thematic Group of Experts and was well received at the 6th World Water Forum in Marseille in 2012.

More broadly, the GCLME Project assisted the countries to develop a broad environmental status baseline against which future trends in ecosystem health can be monitored, and adaptive management applied, during the SAP implementation phase.





*Planting in the Niger Delta to restore threatened mangroves and reduce coastal erosion. Progressive transfer of potted nursery bags to the nursery plot.*



*Marine Protected Area (MPA) Site Avkete, Benin.*

# Agulhas and Somali Current Large Marine Ecosystems (ASCLME) Project



Fish Market, Victoria, Mahé, Seychelles © photographer: James Stapley.

## INFORMATION BOX

**Scope:** Regional

**Countries:** Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, South Africa, Tanzania. Somalia has "country observer" status and is included wherever possible. Strong cooperation with French research institutions covers French Indian Ocean territories.

**Partners:** GEF, NOAA, ACEP, Nairobi Convention, UNOPS, IUCN

**GEF Grant:** \$12.923 million

**Co-Finance:** \$18.262 million

**Project Cost:** \$31.185 million

**Project website:** <http://www.asclme.org/>

## Project Context

The Western Indian Ocean (WIO) supports the people and economies of nine countries, including a coastal population of some 56 million. Globally important fisheries (notably tuna) and endangered wildlife are also characteristic of this region. Increasingly, the role of the greater Agulhas Current is being recognised as a major component and driver of the world's climate. Against a background of global uncertainty over the impacts of climate change, understanding this marine system will be vital.

Yet much about the Agulhas/Somali system is poorly understood with only around 50% of marine species having been described. The countries of the region lack capacity to undertake modern oceanographic research, and to achieve World Summit on Sustainable Development (WSSD) targets that called for implementation of the Ecosystem Approach to Fisheries (EAF). The ASCLME Project aims to address these issues, particularly surrounding EAF, oceanography and small scale/artisanal fisheries.

## Threats and Causes

The ASCLME region is considered extremely vulnerable to climate change. The relatively poor understanding of the region's marine biophysical environment makes management particularly challenging. Much of the coastal population is engaged in or relies upon marine resources for subsistence. The recently completed Causal Chain Analysis identified root causes of transboundary issues which include: rapidly increasing coastal population; ineffectively managed fisheries; and a lack of human, infrastructural and financial capacity for research and management. Compounding and related issues include: habitat loss; coastal erosion and pollution.

## Results Delivered

### Process Results

The ASCLME Project has undertaken several novel approaches to meeting the challenges of TDA/SAP development, such as the creation and execution of a pre-TDA stage, the Marine Ecosystem Diagnostic Analysis (MEDA). This comprehensive, state-of-the-environment report, documents the threats to the ecosystem in each country that are either transboundary in nature or cross-cutting affecting each of the countries. The nine MEDA reports represent a knowledge resource which is already useful to researchers and resource managers. This process has created significant buy-in to the TDA/SAP process, particularly at the technical and management level, and built strong in-country support of the Project.

Marine ecosystem management regimes are often limited to the areas encompassed by Exclusive Economic Zones (EEZs) (which in turn often closely align with assigned LME boundaries). However much of the Agulhas/Somali Large Marine Ecosystem extends beyond this and represents “Areas Beyond National Jurisdiction” (ABNJ) or High Seas that are relatively poorly policed and managed. Compilation of a TDA and SAP limited solely to EEZs may therefore be shortsighted by inappropriately delimiting the true ecosystem boundaries. In turn such analysis may provide limited understanding of the whole ASCLME, potentially resulting in ineffective policy decisions and management. The ASCLME Project is developing its TDA/SAP with these challenges in mind, ensuring the management of ABNJs is considered within the SAP.

The ASCLME Project has been successful in attracting partners, not only to its project activities (eight MoUs and Aide Memoire signed to date with another ten under final preparation), but also to a longer term Western Indian Ocean Sustainable Ecosystem Alliance (WIOSEA). This Alliance will facilitate long term ecosystem monitoring and sustain the infrastructural and human capacity needed to ensure long term SAP implementation. A key principle of WIOSEA will be to coordinate without undermining the autonomy or responsibility of existing regional organizations and bodies, by fostering stronger partnerships, acquiring sustainable funding resources and rallying political and social will to effectively implement the LME approach in the WIO region. Implementing and monitoring measurable environmental and social status projects will be a key focus.

The Project has undertaken both traditional ‘class room’ capacity-building exercises and shipboard learning to establish a capable cadre of over 100 well-trained scientists and technicians who can undertake research and conduct analyses for successful SAP implementation, long-term monitoring and management.

Peer reviewed scientific publications form a cornerstone of the Project’s mission to gather credible and accurate scientific information as the basis for its TDA and SAP. This process also builds additional capacity by including junior scientists and technicians in the drafting process. To date, some 50 plus peer-reviewed publications have been published as a result of some 22 research cruises and other project information gathering and synthesis activities.

In sum, the project has spurred regional action to undertake coordinated management interventions, and successfully promoted the concept that LME research and management integrate areas beyond national jurisdiction (ABNJ).

- » Four million tons of fish catches annually;
- » \$943 million in annual fisheries revenues;
- » The livelihoods of over 56 million people who depend upon marine and coastal resources;
- » Tourism linked to healthy marine environments accounts for approximately 30-50% of GDP in island states such as Mauritius and Seychelles;
- » At least 200 species of coral, 11 of mangrove and 12 of seagrass, 1,500 species of fish, 3,000 species of molluscs, 450 species of crabs, 300 species of echinoderm and five of the world’s seven marine turtle species. Overall species composition is rich, exceeding 11,000 species of plants and animals, 60-70% found only in the Indo-Pacific ocean region.

### Stress Reduction Results

The ASCLME Project is in SAP Preparation Phase, and has not yet implemented targeted Stress Reduction interventions. However, the Project has filled information gaps which will enable the identification of effective SAP stress reduction actions. A lack of information/understanding can result in significant environmental stress, and whilst hard to quantify and measure, baseline assessments represent a vital foundation for assessing the long-term impact of stress reduction actions.

From international partners, notably NOAA and NIOZ, the ASCLME Project has attracted significant additional cash and in-kind contributions to knowledge generation and monitoring of over \$14 million.

The ASCLME Project and its partners have spent approximately \$6.2 million on filling key knowledge gaps needed to inform the identification and implementation of stress reduction activities.

### Environmental and Socioeconomic Status Results

Since the project is still in its SAP Preparation Phase with stress reduction measures still to come, measurable changes in environmental status are not yet discernible. However, the project has established an outstanding environmental status baseline upon which future changes, trends and improvements in ecosystem status can be measured and tracked. The project has also substantially strengthened country capacities for monitoring and assessment of the changing status of these marine ecosystems.

# Implementation of the Benguela Current Large Marine Ecosystem (BCLME) Strategic Action Programme



*The BCLME supports vital commercial fishing activity. Here a catch of snoek, *Thyrsites atun*, is offloaded at a slipway near Cape Town © Claire Attwood.*

## INFORMATION BOX

**Scope:** Regional

**Countries:** Angola, Namibia and South Africa

**Partners:** GEF, Benguela Current Commission, UNOPS, ORASECOM, Norway, Iceland, International Knowledge Management (IKM), European Union

**GEF Grants:** \$20.138 million

**Co-Finance:** \$88.634 million

**Project Cost:** \$108.773 million

**Project website:** <http://www.bdme.org/>

## Project Context

The Benguela Current Large Marine Ecosystem Strategic Action Programme Implementation (BCLME SAP IMP) Project succeeded the BCLME Programme, after the latter had completed a Transboundary Diagnostic Analysis (TDA) and developed a SAP that was endorsed by Angola, Namibia and South Africa. The SAP IMP Project will review and revise the SAP to include the latest priority transboundary policy and management actions and facilitate implementation of such policy and management actions. The project objective is to implement the BCLME SAP through the adoption of national policy reforms; the sustainable institutionalisation of a regional Commission; and the endorsement and ratification of a binding international Convention for the LME. The project currently enjoys substantial political and managerial support from the countries to meet its objectives.

## Threats and Causes

Key threats to BCLME resources include: declining fish stocks; mining and drilling impacts; unplanned mariculture development; destruction/alteration of habitats and biotic integrity; uncertainty and unpredictability of ecosystem status; inadequate monitoring, assessment and management and the requisite capacities; harmful algal blooms; deterioration of coastal water quality; major oil spills; and land-based sources of pollution.

Root causes identified through the TDA include: the highly variable nature of the ecosystem; limited capacity for monitoring, assessment, management and control; limited/lack of information and data; limited knowledge and understanding of the system; uncontrolled coastal development, coastal and marine exploration and mining; differing regional policies and laws; and lack of space and capacity for mariculture development.

## Results Delivered

### Process Results

The Benguela Current Commission (BCC) is now fully operational. Two ministerial conferences were held where support for the Commission and the Convention process was reaffirmed by ministers. National Task Groups for the Convention development process completed a draft Convention over four regional negotiations. A Regional Data and Information Sharing Policy and Protocol has been agreed and will be signed once the Convention is signed. The BCLME SAP IMP Project supported the development of a Management Plan for Cape Hakes in Namibia. Other achievements include establishment of the Africa LME Caucus, setting up of a Minerals and Extractive Industries Working Group and a Regional Training Advisory

Group. Policy and management frameworks are also in place for the BCC Secretariat. The Convention and the Regional Data and Information Sharing Policy provide an important framework for cooperation, hence the focus to have these outputs in place as early as possible.

### Stress Reduction Results

BCC has scientific projects underway to address environmental threats and stressors that will inform the project. The SAP IMP project initiated a partnership between BCC and ORASECOM (Orange-Sengu River Basin Commission) for the development of a management plan for the Orange River Mouth estuary. Since inception, the Project has focused on the Convention as the key instrument necessary for advancing regional cooperation in LME monitoring, assessment and management, and to have the Secretariat institutionalised under the Convention. Once the final Convention text is agreed and the Convention formally adopted, the project will support the development of planning, management and regulatory instruments that will lead to stress reduction. Instruments to be developed in 2012 include for example regional water quality standards and development of a joint management plan for horse mackerel between Angola and Namibia in partnership with the ACP-EU Fish II Project. A 2011 User Data Needs Analysis confirmed the need for monitoring of stress reduction in the BCLME.

### Environmental and Socioeconomic Status Results

While implementation of the SAP is still at too early a stage to deliver discernible improvements in the health of the BCLME, the BCC has initiated projects under its Science Programme that will enable establishing an environmental status baseline. A project

- » The BCLME is the only eastern boundary upwelling current that is bound by two warm water currents at the northern and southern borders of the ecosystem;
- » Total fishing landings in the BCLME peaked at about 2.8 million mt in 1975 and have declined by almost two thirds;
- » About 60% of commercially exploited stocks have collapsed with another 10% overexploited;
- » Fishing contributes 9% of Namibia's GDP and provides 50% of Angola's annual protein needs;
- » The BCLME is a Class 1, highly productive ecosystem (>300 gC/m<sup>2</sup>/yr).

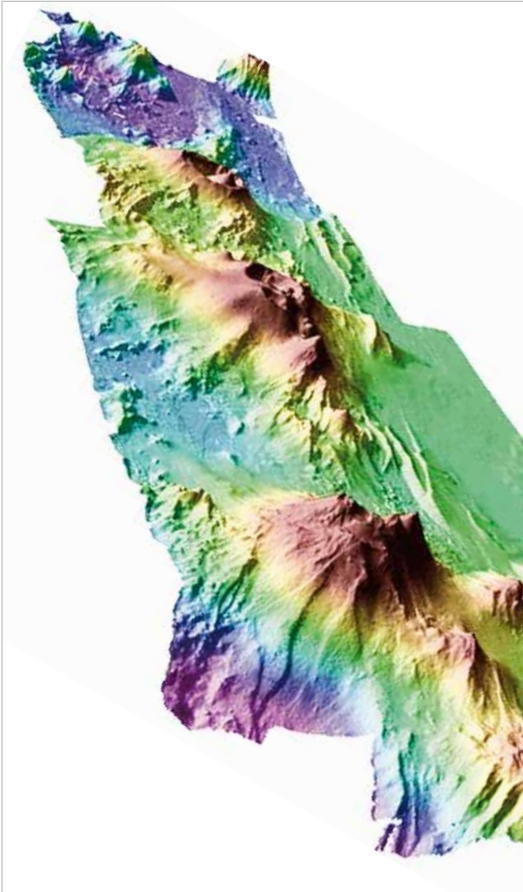
is underway that identifies and maps areas of high biodiversity importance and areas under threat. The output of this project will assist in better identifying indicators that are relevant and appropriate, and to be more area specific to achieve quantitative measurable results. The project has the support of the BCC and the FAO/Nansen Human Dimension EAF Project that explores the human side of fisheries and what the socioeconomic and livelihood consequences may be if fisheries do not improve. In addition, a valuation of the ecosystem's goods and services is aiming to provide indicators to better monitor and assess the impact of SAP implementation on socioeconomic indicators.

The effect of climate change on the BCLME's borders is unknown, although changes in the form of uncommon eastward migrations of some fish species toward the Agulhas Current is already being observed.



Five government ministers from Angola, Namibia and South Africa, participated in a Ministerial Conference of the Benguela Current Commission on 25 March 2011.

# Ecosystem-based Approach to Fisheries Management – Seamounts in the Southern Indian Ocean



Example of a seamount chain courtesy of NIWA © Censeam.

## INFORMATION BOX

**Scope:** Regional

**Countries:** South Africa, Mozambique, Madagascar, Mauritius, Norway, UK

**Partners:** GEF, IUCN, ASCLME project, NORAD, NERC, IOZ/ZSL, ACEP (African Coelacanth Ecosystem Programme), ECOMAR, FAO Fisheries and Aquaculture Department and EAF Nansen Project, IMR, SIODFA, The South African Institute for Aquatic Biodiversity (SAIAB), Total Foundation, CenSeam (CoML), Rhodes University.

**GEF Grant:** \$0.950 million

**Co-Finance:** \$4.810 million

**Project Cost:** \$5.760 million

**Project website:** [http://www.iucn.org/about/work/programmes/marine/marine\\_our\\_work/marine\\_governance/seamounts/](http://www.iucn.org/about/work/programmes/marine/marine_our_work/marine_governance/seamounts/)

## Project Context

Seamounts are underwater mountains that are hotspots of biological activity and their aggregational effect has been noted by the commercial fishing industry. It is crucial to improve the scientific understanding of the role of seamount ecosystems in global ocean biodiversity.

The project's objective is to apply an ecosystem-based approach to fisheries management for biologically and globally significant and commercially important areas beyond national jurisdiction in the Southern Indian Ocean, focusing on seamounts, with a long-term aim to demonstrate innovative approaches to improving conservation and management of unique biodiversity and ecological resources in the high seas.

The four anticipated project outcomes include: improved scientific understanding and capacity for monitoring, assessment and analysis of high seas biodiversity and fisheries; enhanced governance frameworks for high seas resource conservation and management; identifying options for conservation and management measures applicable to high seas areas in the Southern Indian Ocean; and learning, awareness raising and knowledge sharing.

## Threats and Causes

There are three main barriers to sustainable fisheries management and marine conservation in the high seas: a lack of scientific knowledge about seamount ecosystems and their relationship with fisheries' resources; a lack of comprehensive and effective governance frameworks for marine biodiversity in the high seas; and difficulty in managing offshore fish stocks, including monitoring, control and surveillance.

For the last 30-40 years, expanding fisheries have emerged as a major threat to many seamount ecosystems. One characteristic of these ecosystems is the slow growing rate of seamount species. These communities take a long time to recover from ecological damage like overexploitation of marine resources (depleting fish stocks) and destruction (bottom trawling). Evidence has shown that deep-sea bottom fisheries can cause depletion of commercially important fish stock in just a few years.

## Results Delivered

### Process Results

A governance workshop in June 2011 drafted a list of recommendations on how to improve the governance framework in the region. Notably, it states that, within the region, it is in particular recommended to encourage implementation of

existing relevant instruments including applicable UN Resolutions, to encourage Parties and signatories of SIOFA (South Indian Ocean Fisheries Agreement) to bring the agreement into force, to collaborate with the CBD Secretariat and FAO in the identification of EBSAs and VMEs in the Indian Ocean areas beyond national jurisdiction, to encourage effective management of all activities that represent risks to biodiversity and ecosystem function in the Indian Ocean and to support negotiations in the UN to draft a multilateral agreement under the Law of the Sea Convention on conservation of biodiversity in marine areas beyond national jurisdiction. The participants of the workshop included representatives from the regional countries (Madagascar, South Africa, Mauritius) working in fisheries or environment departments of their governments.

The two research expeditions, the taxonomic workshop, in general, and the discovery of a new species of squid (see photo), in particular, generated high profile press coverage by the BBC and the National Geographic, among other international outlets. By generating interest from major international press outlets, the project raised awareness of policy makers around the world about deep sea biodiversity and the need to manage and protect the high seas.

### Stress Reduction Results

One long-term objective of the project is to reduce fishing pressure on high seas ecosystems like seamounts ecosystems in the southern Indian Ocean. As policy and governance options for these seamount ecosystems are further promoted and adopted, this should in time help to achieve this stress reduction objective but these impacts may occur post-project.

### Environmental and Socioeconomic Status Results

By conducting some of the first assessments of these seamount ecosystems, the project created a vital environmental status

- » Seamounts are often hotspots of biological diversity and production;
- » Migratory fish and cetaceans rely on seamounts as well for their food supply;
- » The deep oceans represent approximately 90% of the habitable area for life on earth but the biodiversity and ecology of these ecosystems are poorly studied and little understood;
- » The effects of deep-water trawling can be highly destructive to the benthos (flora and fauna at the bottom of the sea);
- » Across the globe, there are an estimated 100,000 seamounts that rise to at least 1,000 metres above the seafloor.

baseline from which to monitor future trends and impacts. The second research expedition of the project took place in 2011. It focused on the benthic realm (at the bottom of the sea) of these deep-sea habitats whereas the first cruise in 2009 studied the pelagic fauna (in the water column) associated to the seamounts. During the taxonomic workshop, 21 scientists from seven countries analysed 7,000 samples of pelagic species collected during the first cruise. More than 200 species of fish and 74 species of squid were identified. The larval stages of approximately 30 fish species were identified. A new species of squid, 70 cm long and belonging to the family Chiroteuthidae, was identified. A number of species were recorded for the first time in the region. In addition to the taxonomic work undertaken at this workshop, genetic samples were taken from 500+ fish and cephalopods specimens. The DNA collection is an extremely valuable reference source of the South West Indian Ridge fish fauna.



*A new species of squid discovered by the project, 70 cms long, belonging to the Chiroteuthidae family.*

# Reducing Environmental Stress in the Yellow Sea Large Marine Ecosystem



*Integrated Multi-trophic Aquaculture (IMTA) buoy field at the production site in Sanggou Bay, Shandong Peninsula, China.*

## INFORMATION BOX

**Scope:** Regional

**Countries:** China and Republic of Korea as full member, and Democratic People's Republic of Korea as observer

**Partners:** GEF, Governments, local governments, UNOPS, NGOs (WWF, Wetland International, local NGOs), private sector (e.g., Panasonic and fishing communities)

**GEF Grant:** \$14.394 million

**Co-Finance:** \$10.214 million

**Project Cost:** \$24.608 million

**Project website:** <http://www.yslme.org>

## Project Context

Among the 64 Large Marine Ecosystems (LMEs) in the world ocean, the Yellow Sea LME has been one of the most significantly impacted by human development. Many of the environmental problems the Yellow Sea faces are of a transboundary nature. Large cities near the sea, with tens of millions of inhabitants, include Qingdao, Dalian, Shanghai, Seoul, Incheon, and Pyongyang-Nampo. Those living in these large, urban areas are dependent on the Yellow Sea as a source of marine resources for nutrition, economic development, recreation, and tourism. The Yellow Sea also receives significant quantities of industrial and agricultural wastes from these activities.

The Yellow Sea LME is an important global resource. This international water body supports substantial populations of fish, invertebrates, marine mammals, and seabirds. However, the majority of these valuable resources have been degraded due to unsustainable use.

## Threats and Causes

The major threats in the Yellow Sea large LME identified through the UNDP-GEF project include (i) overfishing, which is beyond the carrying capacity of the ecosystem; (ii) the unregulated discharge of pollutants to the marine ecosystem; and (iii) modification of marine habitats along coastal areas.

Through the causal chain analysis of the Transboundary Diagnostic Analysis (TDA), the most frequent root causes included development being undertaken with limited comprehensiveness and coherence of the legislative base for environmental and biodiversity protection, coupled with poor enforcement; inadequate public information; and inadequate balance between development and environmental protection policy.

## Results Delivered

### Process Results

Inter-Ministerial Coordinating Committees (IMCC) have been established in both China and Republic of Korea, and the Committees are functioning effectively. The major project decisions are made based on the decisions and agreements of the IMCC.

China and the Republic of Korea, as full members of the project, have formally endorsed the Transboundary Diagnostic Analysis (TDA). The document has also been formally supported by DPR Korea as an observer of the project.



China and the Republic of Korea, as full members of the project, have formally endorsed the regional SAP. The document has also been formally supported by Democratic People's Republic of Korea (DPRK) as an observer of the project. The national SAPs have been endorsed by the respective governments of China and Republic of Korea. Following effective discussions and negotiations of the governments of the participating countries, it was formally agreed, and included in the Strategic Action Programme (SAP), that a YSLME Commission should be established with major responsibilities to coordinate the regional efforts in implementing the SAP, and long-term cooperation.

The Yellow Sea Partnership has been established with participations of more than 20 institutions, including UN agencies and projects, international NGOs, local NGOs, and research institutes. The Partnership will serve as coordinating mechanism for the relevant activities in marine environment protection and conservation actions in the Yellow Sea. Major stakeholders are involved in the project activities, such as the Parliamentary Organizations and private sector, as indicated in the section on major results of the project.

A regional Marine Protected Area (MPA) network has been established and is functioning for better conservation of marine biodiversity in the Yellow Sea. With the offer of a local government, the secretariat of the Network may be established within 2011. It will ensure self-sustainability of the MPA Network.

### Stress Reduction Results

Under the SAP, tangible targets on reducing fishing efforts were agreed, including reducing 30% of the fishing boats. The relevant actions (including boat buy-back and training on alternative livelihood etc.) are starting to be undertaken in the countries.

Sustainable mariculture has been promoted and advanced. Integrated Multi-Trophic Aquaculture (IMTA) and heterotrophic shrimp culture have been implemented in the participating countries. The results of these activities show that while the farmers obtain better economic yield, the marine environment is far less affected compared to the traditional methods of mariculture.

Under the SAP, the governments of the participating countries agreed to reduce by 10%, every five years, the nutrient discharges to the marine environment. Relevant actions have been undertaken to establish new waste water treatment plants and improve existing waste water treatment abilities, and reduce agricultural run-off of nutrients to the Yellow Sea basin.

Through joint efforts on biodiversity conservation with The World Wildlife Fund (WWF), the important role of MPAs has been

- » The Yellow Sea's name comes from the sand particles from Gobi Desert sand storms that turn the surface of the water golden yellow;
- » The area of the Yellow Sea is 380,000 square km but its average depth is only 44 metres;
- » Yellow Sea tides can reach 8 metres in some parts of the Republic of Korea;
- » The Yellow Sea area is the single most important site for migratory birds on northward migration in the entire East Asian – Australasian Flyway, with more than 35 species occurring in internationally significant numbers;
- » About 200 fish species are exploited commercially, especially sea bream, croakers, lizard fishes, prawns, cutlassfish, horse mackerel, squid, eel, filefish, Pacific herring, chub mackerel and flounder.

recognised. A good example is the new marine protected area in Chu Dao, Shangdong Province, which China has approved.

In total, about \$10.2 billion has been committed by the governments of the participating countries to implement the SAP over a 15-20 year time frame.

### Environmental and Socioeconomic Status Results

Regional cooperative cruises were organised by the project. Through the surveys and observations of the cruises, new scientific data was collected, analysed and published. It was found that while some environmental conditions have improved (e.g., harmful algal blooms), some new problems have arisen (e.g., jellyfish overabundance and hypoxia).

Through the joint regional fishery stock assessment, it was found that the total biomass of the Yellow Sea is slowly recovering. However, more actions are required to deal with the declining trophic level of fish species in the Yellow Sea.

Monitoring environmental status and trends requires long term, sustained efforts. Through the Project, the countries agreed to establish a regional monitoring network for better understanding of the status of the marine environment and to inform 'adaptive management' of SAP implementation.

# Arafura and Timor Seas Ecosystem Action Programme (ATSEA)



ATSEA Cruise 2 onboard RV Solander, exploring the northern Australia waters and Timor-Leste's part of the Timor Sea, July 2011 (Photo: F. Rijoly, ATSEA, 2011).

## INFORMATION BOX

**Scope:** Regional

**Countries:** Indonesia, Australia, Timor-Leste and Papua New Guinea

**Partners:** GEF, UNOPS, The World Wide Fund for Nature, Sustainable Forestry Partnership, The Nature Conservancy, Conservation International

**GEF Grant:** \$2.500 million

**Co-Finance:** \$6.248 million

**Project Cost:** \$8.748 million

**Project website:** <http://atsea-program.org>

## Project Context

The tropical and semi-enclosed Arafura and Timor Sea (ATS) region is extremely rich in living and non-living marine resources, including major fisheries and oil and gas reserves. It is located at the intersection of the two major Large Marine Ecosystems (LMEs): the Indonesian Sea and North Australian Shelf LMEs, and is also an integral part of the Coral Triangle Zone. The ATS region has productive fisheries, including high-value, shared, transboundary fish stocks that provide livelihoods and food security for millions of people in the region. In this context, the surrounding coastal countries including Australia, Indonesia, Timor-Leste and Papua New Guinea agreed to conduct a regional effort to ensure the integrated, cooperative, sustainable, ecosystem-based management and use of the living coastal and marine resources, including fisheries and biodiversity of the ATS, through the formulation, intergovernmental adoption, and initial implementation of a Regional Strategic Action Programme (SAP).

## Threats and Causes

Background studies indicate that the biophysical condition of the ATS is facing transboundary threats from human-related activities and natural causes. The threats, known as Priority Environmental Concerns, include: unsustainable fisheries; decline and loss of biodiversity and key marine species; modification, degradation and loss of coastal and marine habitats; marine and land based pollution (e.g., marine debris, sediments, oil spills); and the impacts of climate change.

## Results Delivered

### Process Results

Background studies on bio-physics and socio-economic impacts of the ATS region were undertaken and strengthened through various workshops and information on field conditions obtained from two ATS cruises. The first cruise was conducted in May 2010 in the ATS waters of Indonesia and Timor-Leste using Indonesia's *R.V. Baruna Jaya VIII*. This cruise studied physical oceanography; bathymetry; fisheries; phytoplankton biomass; nutrients; surface sediments; pollution from Polycyclic Aromatic Hydrocarbon (PAH) and heavy metals; and illegal, unreported and unregulated (IUU) fishing. The second cruise explored the ATS waters of Australia and Timor-Leste using Australia's *R.V. Solander* in June-July 2011. The main objective of the Solander cruise was to conduct detailed surveys of the benthos and water column within individual reefs on the Sahul Banks off northwestern Australia and along the entire southern coast of Timor-Leste. This cruise has produced more than 10,000 photos and over 75 hours of detailed videos of these reefs.

ATSEA has established a Stakeholder Engagement Group (SEG) consisting of core members and general members from ATSEA countries. SEG is represented by non government stakeholders and will provide advice and support to the Project Board. In particular, SEG members may identify relevant scientific issues to the Project Board, including global concerns that pertain to, or affect, the ATS region. Core members belong to an expert group or a scientific group that work together with the PMO to coordinate efforts towards priority issues and activities, including input to, and completion of, the Transboundary Diagnostic Analysis (TDA), SAP and NAPs. At the annual ATSEA SEG meetings information about complementary ATSEA activities is shared between core and general members.

ATSEA has also established a Regional Scientific Committee (RSC) consisting of seven members selected from SEG Core Members from each ATSEA country. The RSC, together with the National Inter-Ministerial Committees, will discuss the TDA and provide further inputs before submission to the Project Board for formal endorsement.

National Inter-Ministerial Committees have been formed in each ATSEA country to discuss, provide inputs, and agree on the TDA. The TDA is at draft stage, and will be finalised shortly.

### Stress Reduction Results

Most stress reduction will begin to be delivered upon implementation of policy and legislative reforms, and investments, agreed to by the countries in the SAP once it has been endorsed. In the nearer term, preparation of a demonstration project, as part of upstream SAP implementation, has been initiated through regional ATSEA meetings with a focus on the development of selection criteria.

- » The Arafura Sea is considered a shallow tropical sea with depth ranging from 50-80 metres;
- » The deepest point in the Timor Sea is the Timor Trough, located in the northern part of the sea, which reaches a depth of 3,300 m (10,800 ft);
- » When sea levels were low during the last glacial maximum, the Arafura Shelf, the Gulf of Carpentaria and Torres Strait formed a large flat land bridge connecting Australia and New Guinea and easing migration of humans from Asia into Australia;
- » The Arafura Sea produces the largest White and Brown Shrimps in Asia;
- » The Timor Sea Treaty between East Timor and Australia, signed May 2002 and ratified February 2007, led to the establishment of the Timor Sea Designated Authority (TSDA), the organisation responsible for the administration of petroleum-related activities in the part of the Timor Sea known as the Joint Petroleum Development Area (JPDA).

### Environmental and Socioeconomic Status Results

Studies to document the current socioeconomic status of selected communities in Maluku Tenggara, Merauke, Rote Ndao and Lautem (northern coast of Timor-Leste) have been conducted in December 2011. A baseline on mangrove and coral distribution within 12 districts of the ATS region has been compiled through Landsat image analysis. Both results and others that are planned will be used to establish a solid baseline against which future SAP implementation can be monitored.



Workshop on Guideline and Criteria Development for ATSEA Demonstration Projects, November 2011.

# Pacific Islands Oceanic Fisheries Management Project (OFMP)



*The project has strengthened the capacity of Pacific Island Countries to work together in managing their valuable oceanic fisheries resources through multi-lateral dialogue and negotiation processes.*

## INFORMATION BOX

**Scope:** Regional

**Countries:** Cook Islands, (Federated States of) Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tokelau, Tuvalu and Vanuatu

**Partners:** GEF, Pacific Islands Forum Fisheries Agency, Secretariat of the Pacific Community, Western and Central Pacific Fisheries Commission

**GEF Grants:** \$15.144 million

**Co-Finance:** \$85.529 million

**Project Cost:** \$100.673 million

**Project website:** <http://www.ffa.int/gef/>

## Project Context

Holding the world's largest stocks of tuna and related pelagic species, the waters of the Pacific islands region are geographically and environmentally significant. Much of this area falls within the jurisdiction of the Pacific Small Island Developing States (Pacific SIDS) and includes adjacent areas of high seas. The environmental health of this area of ocean is critical to communities and economies of the Pacific and to the global community.

Two sequential UNDP-GEF International Waters projects sought to improve the understanding of the ecosystem, with a focus on the transboundary oceanic fish resources and related features of the Western and Central Pacific Warm Pool Large Marine Ecosystem. They also supported efforts to create new regional institutional arrangements and to reform, realign and strengthen national arrangements for conservation and management and the optimisation of sustainable economic returns from the region's immense tuna fisheries.

## Threats and Causes

The unsustainable levels and patterns of exploitation of the oceanic fish stocks of the Pacific Islands region is the main transboundary waters concern that underlies the origins of this sequence of projects, including their preparation, structure and objectives. The stocks of interest are principally migratory and their range extends through the waters under the jurisdiction of many countries and large areas of high seas.

The root causes underlying the concerns and threats to the unsustainable use of fish stocks were identified as weaknesses in governance and a lack of understanding at regional and national levels in the Pacific. At the time of the first UNDP-GEF intervention, this included the lack of a legally binding institutional arrangement governing cooperation in the management of the region's commercial oceanic fisheries and compatible national arrangements. Gaps existed in information, knowledge and awareness of both target and non-target stocks, and stock assessment modeling development was still in its very early stages.

## Results Delivered

### Process Results

Among the most significant process outcomes from the OFMP has been its contribution to the negotiation and coming into force of the Western and Central Pacific Fisheries Convention (WCPFC) in 2004 and the subsequent establishment of the Western and Central Pacific Fisheries Commission. The Convention entered

into force in 2004, with 12 of the 13 required ratifications being from Pacific SIDS. By the first meeting of the Commission in December that year, rules of procedures and the organisational structure of the WCPFC had been adopted. The WCPFC has now been ratified by 33 of the 34 States and Territories that participated in the WCPFC process.

The WCPFC currently operates a work programme with an annual budget of \$6 million. Its contribution formula is structured so that the burden of contributions for the management of migratory fish stocks are expected to be carried by those those fish.

The project has played a significant part in the coordination of effective participation by the Pacific Island countries in the foundational period of the Commission with high levels of attendance recorded (80 – 100%) at the Commission meetings and at its subsidiary Science and Technical and Compliance Committees. This project support was directed at ensuring that Pacific SIDS were fully prepared to take part in the formative meetings of the Commission and has contributed towards substantial SIDS capacity building. The project has also supported the participation of non-governmental representation, both environment and industry, in the work of the WCPFC.

At national levels support has extended to WCPFC-related legal, policy and institutional reviews in all 15 Pacific SIDS including national fishery status reports, legal reviews, and reviews of management plans based on an ecosystem approach to fisheries management, and by regional scientific, legal, compliance and policy workshops and consultations.

### Stress Reduction Results

The projects have supported the adoption and implementation by WCPFC and the Pacific SIDS of a range of innovative measures to promote sustainable fisheries, some of them globally precedent-setting, including:

- The largest rights-based cap and trade management scheme in international fisheries – the Parties to the Nauru Agreement (PNA) purse seine vessel day scheme (VDS);
- Seasonal closures on fishing on floating rafts (FADs) to reduce by-catches;
- A 30% reduction in catches of vulnerable bigeye tuna by major longline fleets;
- Large scale high seas closures to purse seine fishing vessels;
- Compulsory retention of catches of major tuna species;
- A ban on setting on whale sharks;
- Measures to reduce shark finning;

- » The waters of the Pacific Islands region cover approximately 40 million square kilometres mostly falling within the jurisdiction (EEZs) of the 15 Pacific SIDS;
- » The area covered by the West and Central Pacific Fisheries Convention covers almost 20 % of the earth's surface;
- » The West and Central Pacific fishery is worth around \$5 billion per year in fisheries revenue;
- » The WCPFC was one of the first international fisheries agreements to be adopted following the conclusion of the 1995 United Nations Straddling Fish Stocks Agreement (UNFSA);
- » The area holds the world's largest stocks of tuna and related species, including sharks, billfish and other large pelagic species, whales and other marine mammals and turtles;
- » Combined with the waters of Indonesia and the Philippines, the WCPFC area provides more than half the world's tuna catches.

- Measures to mitigate by-catches of seabirds and turtles;
- The world's largest onboard observer programme, including 100% coverage on tropical purse seine vessels;
- The only high seas boarding and inspection programme in global tuna fisheries; and
- The world's largest international satellite-based vessel tracking programme, tracking over 2,000 high seas tuna vessels.



*Fleets from distant water fishing nations harvest tuna resources at sustainable levels in exchange for access fees collected by the PICs.*

Conservation and management measures are based on advice provided by the Secretariat of the Pacific Community (SPC) Oceanic Fisheries Programme (which is both contracted to provide science to the WCPFC and its Scientific Committee and directly to Pacific SIDS members) and on information collected and analysed from integrated national and regional monitoring programmes, databases and information systems.

Information and knowledge improvements have been made over the life of the project in determining the status of target and some non-target stocks; improving understanding of the ecosystem, including trophic status; better understanding of the impact of environmental variability on target species abundance and distribution; and assessments of ecological risk.

### Environmental and Socioeconomic Status Results

Pacific SIDS are committed to the improvement of their contribution towards sustainable development through improved management of the region's oceanic fishery resources and the conservation of oceanic marine biodiversity generally.

While target stock conservation priorities, including recommended reductions and limits to achieve those, have been agreed to the Commission, the impacts are not yet measurable.

The most recent assessments of the major measure (bigeye tuna conservation) suggest that the limits are starting to have a positive result, but probably need to be further strengthened to achieve the agreed objective. Significant reductions in mortality from fishing on non-target species are also becoming discernable. Lastly, progress has been made in measuring indicators of socio-economic contributions of oceanic fisheries for Pacific SIDS through a range of economic indicators and associated modelling.



*Policing the vast EEZs of the PICs has become a challenge but the countries have put in place a regional observer programme to ensure compliance.*

Globally, there are 263 watersheds that cross the political boundaries of two or more countries; these watersheds represent about one half of the earth's land surface and 40% of global population. These facts underscore how much water connects us all but also highlight the potential for conflict – and for cooperation.

Waters that cross national borders can carry pollution from upstream to downstream countries, impacting human health and livelihoods. Upstream countries can extract too much water, or use it inefficiently, impacting the needs and livelihoods of downstream users as well as the environmental needs for water of critical aquatic habitat such as wetlands and mangroves. Continued population growth and economic development can further exacerbate these effects. The United Nations estimates that, by 2025, as many as 1.8 billion people will live in countries or regions facing water scarcity, and as much as two-thirds of the world's population could be facing water stress. Climate change, which is already altering the global water cycle at an unprecedented rate, adds further complexity to these challenges through its impacts on the timing, intensity and variability of rainfall, droughts and flooding.

But history shows that cooperation, not conflict, has been mankind's prevalent response to the challenges presented by transboundary waters. Over the last 60 years more than 300 international water agreements have been reached while there have only been 37 cases of reported conflict between states over water. Even more important, cooperation on shared waters has been shown to go 'beyond the shared waters' and help to build mutual respect, understanding and trust among countries and to promote peace, security and regional economic growth.

UNDP has been involved as a GEF Agency in a total of 19 transboundary river (10), lake (7) and aquifer (2) projects and has cumulatively programmed \$176 million in GEF International Waters funding towards these river basin, lake and aquifer management programmes. In each of these shared water systems, UNDP-GEF has successfully applied the GEF's Transboundary Diagnostic Analysis/Strategic Action Programme (TDA/SAP) methodology for issue prioritisation, causal chain analysis and multi-country agreement on governance reforms and investments. Chapter 2 highlights key results delivered to date in eleven of these transboundary waters programmes.

## Transboundary Rivers, Lakes and Aquifers



# Environmental Protection and Sustainable Management of the Cubango-Okavango River Basin (EPSMO)



*Elephants foraging in the Cubango-Okavango River Basin.*

## INFORMATION BOX

**Scope:** Regional

**Countries:** Angola, Botswana, Namibia

**Partners:** GEF, OKACOM, FAO

**GEF Grant:** \$6.000 million

**Co-Finance:** \$5.176 million

**Project Cost:** \$11.176 million

**Project website:** <http://epsmo.iwlearn.org>

## Project Context

The Cubango-Okavango River Basin remains one of the basins least affected by human impact on the African continent. In its present near-pristine status, the river provides significant ecosystem benefits and, if managed appropriately, can continue to do so. However, mounting socio-economic pressures on the basin in the riparian countries of Angola, Botswana, and Namibia could change its present character. There is a critical need to establish sustainable management of its resources.

The project was designed to help remove the barriers preventing joint agreement on actions to protect the basin's globally valuable ecosystems by sustainably managing shared water resources. The project focused on reaching a science based diagnostic analysis (TDA) of transboundary environmental problems, as a basis for building consensus among riparians on selected priority actions (SAP) needed to address transboundary problems, including policy, legislative and institutional reforms.

## Threats and Causes

Four emerging priority transboundary concerns were identified by countries during the TDA process: variation and reduction of hydrological flow; changes in sediment dynamics; changes in water quality; and changes in the abundance and distribution of biota. These concerns reflect new development pressures on the basin that are as yet not fully realised. Four underlying driving factors or root causes were identified: population dynamics; land-use change; poverty; and climate change.

## Results Delivered

### Process Results

Permanent Okavango River Basin Commission (OKACOM) approved the finalised TDA in May 2011 and as of late 2011 was in the process of seeking Ministerial endorsement of the SAP. Country based priority activities identified through the SAP process were codified in National Actions Plans (NAPs) which are being incorporated into existing and new national management processes. Several projects in the Cubango-Okavango River Basin supported by international cooperating partners have aligned their objectives to those identified in the SAP. As the Cubango-Okavango system is still relatively free of development impacts, many of the planned interventions identified by the SAP focus on acquiring additional data and information to prevent unwanted consequences of development.

Under the SAP, a review is planned of climate change scenarios for the Cubango-Okavango basin and determination of its impact on water resource yield and demand under the most likely climate change scenarios; linked to this will be efforts



to identify suitable climate change adaptation measures tailored to livelihood options. Additional activities planned under the SAP include: production of basin-wide flood risk maps; development of a basin-wide flood forecasting model and flood early warning system; mapping of the basin's vegetation cover, economical-ecological aptitude and land use potential; mapping of erosion in sub-basins and municipalities; and mapping and impact assessment of invasive species. A review is planned of national permitting and licensing procedures and national policies regarding law enforcement of regulations to inform efforts to strengthen these. An analysis of IWRM approaches in the three basin states (including analysis of basin components in national IWRM plans) will be conducted and complemented by development of common methodologies for component demand forecasts over a twenty year planning horizon and determination of water resource surpluses and deficits. The environmental flow requirements of key locations in the basin will also be determined. These and other activities will inform the development of an overall OKACOM IWRM Master Plan. Efforts are also planned to ensure harmonisation of fishing regulations among basin states.

### Stress Reduction Results

The SAP's planned stress reduction activities include: demonstration of climate change adaptation measures in selected pilot sites; restoration of degraded river banks and riverine forests and establishment of vegetation buffers; establishment of transboundary programmes for control of alien plant species; establishment of a coordinated basin-wide bush and forest fire control programme; development and implementation of community awareness raising activities for wetland management; development and implementation of a training programme in conservation agriculture techniques; and development and pilot implementation of strategies for mitigation of human/wildlife conflicts in agriculture. Also planned are identification, demarcation and establishment of fishing reserves; establishment of new fish hatcheries and basin-wide biodiversity integrity guidelines for aquaculture; and establishment of appropriate aquaculture programmes.

### Environmental and Socioeconomic Status Results

Much of the planned SAP work involves establishing a robust environmental and socioeconomic status baseline through the improvement of data gathering and analysis and monitoring systems in the basin. These include: review of national meteorological and hydrological monitoring networks; development of a harmonised basin-wide monitoring programme; development of a strategic phased investment programme for the improvement of the meteorological and hydrological monitoring network; development and implementation of targeted training courses in meteorological, hydrological, water quality and sediment monitoring; assessment of existing groundwater information

- » The Cubango-Okavango River Basin has a hydrologically active area of 323,192 square kilometres and is approximately 1,000 km in length;
- » Discharging to an endorheic basin, the Okavango does not have an outlet to the sea, it empties into a swamp in the Kalahari Desert, known as the Okavango Delta or Okavango Alluvial Fan;
- » 48% of the Okavango basin territory is in Angola, 37% in Botswana and 15% in Namibia;
- » Economic benefits from the River's resources for the three countries are 19%, 45% and 32% respectively to Angola, Botswana and Namibia;
- » The basin is home to about 600,000 people and has only three urban centres: Menongue in Angola, Rundu in Namibia, and Maun in Botswana.

and identification of knowledge gaps; assessment of the present monitoring network and development of a common groundwater monitoring strategy; drilling and installation of additional monitoring boreholes where needed; and development of monitoring capacity at local level. Also planned are: baseline survey of pollution in the river and identification of hot spots; production of a bi-annual water quality report; development of basin-wide standards for water quality and monitoring protocols; establishment of a common water classification system; development of a basin-wide water quality improvement plan; production of a historical baseline report on sediment transport; and investigation of rates of change of river topography and physiology.

Planned activities that should have a direct impact on improving livelihoods and living conditions include development of basin-wide tourism marketing, promotion and knowledge exchange strategies; joint ventures between existing and upstream tourism developers; development of an investment programme to promote investments from downstream to upstream; establishment of pilot joint transboundary tourism operations in cooperation with the private sector and basin communities; development of a basin-wide rangeland management programme with common property management; development of basin-wide livestock and wildlife health and disease control management strategies; and establishment of a programme to increase productivity of small scale livestock. Also planned are identification of innovative local water and sanitation solutions; provision of sustainable water supply and sanitation to basin communities; Multi-Sectoral Investment Opportunity Analysis (MSIOA); analysis of economic opportunities from Green Development Mechanism (GDM); and analysis of economic opportunities from REDD+.

# Reversing Land and Water Degradation Trends in the Niger River Basin



*Traditional pinasse (boat) on the Niger River.*

## INFORMATION BOX

**Scope:** Regional

**Countries:** Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Guinea, Mali, Niger and Nigeria

**Partners:** GEF, World Bank, Niger Basin Authority

**GEF Grant:** \$13.000 million

**Co-Finance:** \$16.902 million

**Project Cost:** \$29.902 million

**Project website:** <http://www.abn.ne>

## Project Context

The Niger River is the principal river of western Africa, extending about 4,180 km. Its drainage basin is 2,117,700 km<sup>2</sup> in area and its source is in the Guinea Highlands in southeastern Guinea. The lack of harmonised regulatory frameworks and policies at the regional level, and the poor capacity of institutions at the regional and national levels, make it difficult to ensure sustainable and equitable management of the Niger Basin's water and land resources. The Basin's development potential has also been hampered by a lack of information exchange between states and at the regional level. This UNDP-GEF project focused on institutional capacity building, data management and stakeholder involvement in tackling basin land and water degradation. The objectives of the project were: (a) to strengthen the capacity of the riparian countries to promote and improve coordinated and sustainable land and water management in the Basin; (b) to strengthen institutional mechanisms in member countries for management of transboundary land and water issues; (c) to develop a Strategic Action Programme (SAP) to improve the conservation and management of land and water resources in the Basin; and (d) to assist the riparian nations in coordinating donor support for implementing a SAP and effective transboundary management.

## Threats and Causes

There are four major threats to the Niger Basin: (i) land degradation in the basin, (ii) degradation of water resources, including water availability, quality and pollution; (iii) loss of biodiversity and (iv) invasion of aquatic plant species. Related immediate causes of these threats stem from unsustainable cutting and systematic pruning of some woody plants used for fodder; bush fires; and the clearing of several forest regions in the south by migrants from Sahelian zones undergoing desertification. There is an absence of rigorous and coordinated monitoring and control of river water quantity and quality, and a lack of administrative structures in charge of managing the diffuse sources of agricultural pollution. Institutional, regulatory and legal frameworks and instruments for environmental management are insufficiently enforced and lack coherence. The local population has a generally low level of environmental knowledge and education, resulting (for example) in limited understanding of the environmental values of wetlands, thereby contributing to the over-exploitation of wetland resources. Finally, the failure to integrate environmental management issues in a comprehensive development process; the poverty of the rural population and its heavy dependency on natural resources for livelihoods; and the exponential growth of the human population and industrial activities along the rivers are major causes of the environmental degradation of the Niger Basin.

## Results Delivered

### Process Results

The project contributed to creating an enabling environment, supporting ongoing dialogue and intensification of collaboration between the nine Basin countries. The project's modalities provided an opportunity for multi-sectoral dialogue, sharing of lessons, learning from each other, and building cohesiveness among key partners. This enhanced regional, sectoral and multi-stakeholder cooperation also contributed to the development, in parallel to the GEF project, of a broader 20-year regional investment programme for the Niger Basin, the Sustainable Development Action Plan (SDAP), totaling \$8 billion.

A comprehensive Transboundary Diagnostic Analysis (TDA) and a Strategic Action Programme (SAP) were completed following a participatory process that included multi-disciplinary teams at the national and regional level. The TDA was completed in 2009 and validated through a participatory process. The SAP also provided a first estimate of the cost of addressing the agreed priority transboundary environmental and water resources issues not included in the SDAP, at an estimated cost of about \$1.5 billion. The SAP was endorsed by the Niger Basin Council of Ministers in November 2010 and it spans the period 2013 – 2027, in parallel to planned implementation phases of the Strategic Development Action Plan (SDAP).

The project improved the overall knowledge base and data-sharing mechanisms in support of appropriate development decision making at the Basin level. In the context of the SDAP, hydrological and economic models of the Niger Basin were developed for key development scenarios and key sectors such as irrigation, energy, and livestock. The models were designed to deliver specific results in terms of impacts of different scenarios on the inner delta (wetland in Mali), reduction of flow in the river, and socioeconomic benefits such as job creation, higher economic return, and higher rice production. The Niger Basin Authority was provided with pertinent information to compare development scenarios and choose the one(s) that minimise environmental impacts and delivers higher overall benefits for the Basin.

### Stress Reduction Results

Delivery of positive impacts on the ground was achieved through a micro-grant programme and a public participation programme. Under the UNDP-implemented components, local activities were supported with 108 micro-grant interventions to demonstrate environmentally sustainable approaches for the reversal of land and water degradation, as a basis for poverty alleviation. Local beneficiaries in each country have been consulted and

## FACT BOX

- » An unusual feature of the river is the Niger Inland Delta that forms where the river's gradient suddenly decreases, the result is a region of braided streams, marshes, and lakes the size of Belgium, seasonal floods make the delta extremely productive for both fishing and agriculture;
- » The river harbours 36 families, and nearly 250 species, of freshwater fish, of which 20 are only found in the Niger River Basin. Eleven of the 18 families of freshwater fish endemic to Africa are represented in the Niger River;
- » The Basin represents a site of important human settlement, hosting about 45% of the West African population and more than 52% of the total population of the NBA member countries;
- » The potential for irrigation within the Basin is estimated by FAO at 2.816 million hectares.

encouraged to participate in resource management, and have developed an environmental awareness that could benefit longer term integrated basin land and water resource management. In this process, NGOs/groups of youth and women were given the opportunity to implement local activities. These local activities have also served to increase the visibility of the Niger Basin Authority (NBA) across all the countries of the Basin.

### Environmental and Socioeconomic Status Results

Environmental status monitoring has improved during the lifetime of the project thanks to collaborative efforts among partners and coordination among NBA-implemented projects.

The project activities contributed to the capacity building of the Niger Basin Observatory (NBO), established in 2006, which is a critical department of the NBA in terms of modeling, monitoring, and providing key data upon which Basin policy-makers base their decisions. The NBO monitors hydrological status and is expected to monitor an additional 28 agreed indicators. The NBA has established an on-line catalogue of Meta data providing information relative to the available data for these indicators, and conducted an assessment of the quality of existing data. A prototype for the Environmental Information System (EIS) for the Basin is complete and on-line. An exchange protocol is already in place for hydrological data that started with earlier support from the Niger-Hycos programme.

# Orange-Senqu River Basin Strategic Action Programme



Irrigated agriculture at the lower Orange River  
© G.Marinovich STORYTAXI.

## INFORMATION BOX

**Scope:** Regional

**Countries:** Botswana, Lesotho, Namibia, South Africa

**Partners:** GEF, Orange-Senqu River Commission, ORASECOM, UNOPS

**GEF Grant:** \$7.000 million

**Co-Finance:** \$32.000 million

**Project Cost:** \$39.000 million

**Project website:** [www.orasecom.org/icps/undpgef.aspx](http://www.orasecom.org/icps/undpgef.aspx)

## Project Context

The four riparian states of the Orange-Senqu River Basin: Botswana, Lesotho, Namibia, and South Africa, depend on the river system for their industrial production, agriculture and economic growth. The river system is regulated by some 30 large dams and includes larger inter- and intra-basin transfers. Extensive water utilisation for urban, industrial and agricultural purposes has significantly reduced the natural flow reaching the river mouth by about half. Increasing demands will rapidly outstrip the river's resources, compounded by projected impacts of climate change. Further stresses include pollution, and land degradation, especially in the ecologically sensitive upstream and dry land areas. The Orange-Senqu River mouth is a designated Ramsar wetland, under threat by changes in the flow of the river, and impacts from mining.

The four states committed to a joint, basin-wide approach to addressing threats to their shared water resources, formed the Orange-Senqu River Commission (ORASECOM) in 2000. Today, ORASECOM is developing an Integrated Water Resources Management Plan for the Basin. Linked to this, a UNDP-GEF International Waters project is supporting the countries in the preparation of a Transboundary Diagnostic Analysis (TDA) and a Strategic Action Programme (SAP).

UNDP-GEF support for an Orange/Senqu River environmental management project started in 2004. Two key results of the preparatory work were 1) a preliminary Transboundary Diagnostic Analysis of the basin and 2) the establishment of a coordinated, multi-donor funded programme framework for ORASECOM.

## Threats and Causes

ORASECOM's ongoing Transboundary Diagnostic Analysis (TDA) identified five priority trans-boundary threats: stress on surface and groundwater resources; altered flow regime; deteriorating water quality of surface and groundwater; land degradation; and alien invasive species. The main root causes identified include inadequate knowledge, insufficient monitoring, inadequate enforcement of regulations, population pressure, socioeconomic growth, insufficient funding, lack of capacity, and insufficient research.

## Results Delivered

### Process Results

To strengthen ORASECOM's institutional and technical capacity for joint management, the project is supporting the establishment of transboundary environmental assessment guidelines; a Water Information System; and public participation mechanisms and capacities.

On World Water Day, 2011, ministers in charge of the Orange-Senqu River Basin agreed to set up a joint working group of water specialists that developed Transboundary Environmental Assessment Guidelines that were considered by the ORASECOM Council in October 2011. Once finalised, these Guidelines will be presented at the next Ministers' Meeting.

Line agencies in the riparian states acquire and manage Basin water data. To encourage data sharing, the Orange-Senqu Water Information System was developed, a web-based portal, providing access to spatial and time series data, as well as scientific research relating to the Basin. With 25,000 files, the system has proved its usefulness in informing the debate around the Basin planning exercise and it is expected to be replicated by other river basin organizations in southern Africa.

Preparation and adoption of the SAP through a multi-stakeholder process is a planned future activity under the current project.

### Stress Reduction Results

In Lesotho, with support from the UNDP-GEF project, communities have recently rehabilitated 28 ha of mountain rangeland, clearing bush encroachment and alien invasive plants, reseeding palatable grasses, and constructing dry stonewalls to combat gully erosion. In Botswana, communities have embarked on dune stabilisation works, on the eradication of alien plants as well as rainwater harvesting. In recognising the nexus between environmental degradation and poverty, both pilot projects also aim at reducing the pressure on the lands through generating alternative income sources.

In partnership with private farmers, another pilot project focuses on improving the water use efficiency in a larger irrigation perimeter, shared by Namibia and South Africa. Developments include: a water management plan for the catchment area; best management practices for irrigation, involving metering, scheduling, tariffing and water trading; and for farms, a focus on water use efficiency, individual metering, and crop enhancement methods.

### Environmental and Socioeconomic Status Results

As part of the 2010 Joint Orange-Senqu Survey to monitor the environmental status of the river system (and will continue to take place on a five yearly basis), a comprehensive survey of heavy metals, persistent organic pollutants (POPs) and polycyclic aromatic hydrocarbons (PAHs) covering some 60 sites in the Basin was undertaken. Riverine sediment, fish tissue and wild bird eggs were collected and analysed. The survey included physical and other chemical water quality parameters, and the overall ecological health of the river system. Selected 'hotspots' were identified but suggested no major transboundary concerns in the area of contaminants.

- » The Orange-Senqu River Basin is the largest river basin in southern Africa south of the Zambezi, with a total catchment area of one million square kilometres, of which approximately 60% is within South Africa with the remainder in Lesotho, Botswana and Namibia;
- » The total population of the Basin is estimated at 19 million. Development ranges from indigenous traditional lifestyles to modern settings, based on resource extraction and meeting globally-driven market demands. Agriculture employs more than 25 % of the Basin's population, whilst others find work in the industrial sector;
- » Economic activity within the Basin area generates 50% of South Africa's GDP and the basin itself supplies more than 80% of South Africa's electricity – almost 50% of all the electricity generated in Africa;
- » The Basin supports globally significant biodiversity including three Ramsar sites.

Another study investigated the interaction between the freshwater system of the Orange-Senqu River Basin and the marine environment of the Benguela Current Large Marine Ecosystem. The study noted negative impacts of the diminished flow regime on the river estuary ecosystem, but found no major negative impacts on the marine environment.

The research on environmental flow requirements of sub-catchments in Namibia and South Africa includes an environmental monitoring programme covering two hydrological cycles at several sites. The research project will recommend environmental flow setting, as well as propose a longer-term efficacy and compliance monitoring system. The study also contributes towards the development of a management plan for the Ramsar site at the Orange-Senqu Mouth, a joint initiative of the environment departments of Namibia and South Africa.



*Cape fur seals bask and swim in Alexander Bay, Northern Cape, site of Orange River mouth.*

# Implementation of the Lake Tanganyika Strategic Action Programme



Lake Tanganyika provides a source of livelihood for over 10 million people.

## INFORMATION BOX

**Scope:** Regional

**Countries:** Republic of Burundi, Democratic Republic of Congo, United Republic of Tanzania, Republic of Zambia

**Partners:** GEF, Lake Tanganyika Authority, UNOPS, AfDB-NDF, FAO, Governments of Burundi, DR Congo, Tanzania and Zambia, ICRAF, IUCN, WWF

**GEF Grants:** \$23.500 million

**Co-Finance:** \$45.616 million

**Project Cost:** \$69.116 million

**Project website:** <http://www.lta.iwlearn.org>

## Project Context

Lake Tanganyika is a hotspot of biodiversity, and contains approximately 17% of the world's available surface freshwater. Over 10 million people rely on the ecosystem services provided by Lake Tanganyika, including water, food, and minerals. Fisheries and agriculture form the main sources of livelihood for the majority of communities in the lake basin.

The UNDP-GEF Project on Lake Tanganyika aims to safeguard biodiversity and natural resources in the lake basin by piloting the implementation of a Strategic Action Programme and supporting the Lake Tanganyika Authority (LTA). The project is part of a multi-partner programme: Lake Tanganyika Integrated Regional Development Programme (PRODAP)<sup>1</sup>, supported by the governments of Burundi, Democratic Republic of Congo (DRC), Tanzania and Zambia.

## Threats and Causes

Principal threats to the Lake Tanganyika ecosystem include:

- Unsustainable natural resource use by rapidly growing human populations;
- Excessive and uncontrolled fishing in the pelagic and littoral zones of Lake Tanganyika;
- Critical lake habitats threatened by erosion and sedimentation, resulting from deforestation, unsustainable land use, and human encroachment;
- Invasive species posing threats to biodiversity and agricultural productivity;
- Domestic and industrial pollution impacting biodiversity as well as human health;
- In addition, climate change impacts, by promoting surface lake warming and stratification and diminished exchange of deep water nutrients, appear to be lowering the productivity of Lake Tanganyika waters with associated impacts on biodiversity dependent upon the lake's natural productivity.

The Lake Tanganyika TDA identified the main root causes behind these threats as poor enforcement of existing regulations, lack of resources, lack of appropriate regulations, and lack of institutional coordination.

## Results Delivered

### Process Results

The present UNDP-GEF Project on Lake Tanganyika follows an earlier GEF intervention that prepared a TDA, designed a participatory Strategic Action Programme (SAP), and facilitated the development of the Lake Tanganyika Convention, ratified

<sup>1</sup> The UNDP-GEF Project is implemented in close partnership with the AfDB and NDF funded Project to Support the Lake Tanganyika Integrated Regional Development Programme (PRODAP is a French acronym).

in 2008, that provides for regional oversight and management of the lake and its resources. The present project successfully supported the establishment of the LTA and its Secretariat, based in Bujumbura, Burundi. The LTA Management Committee (MC), which includes senior members of relevant Ministries in each of the four riparian countries, is now fully operational. Regional meetings of the LTA MC and the Conference of Ministers are organised at least once every year, with support of the project.

The project successfully involves a diversity of stakeholders in the updating and implementation of the SAP, ranging from government partners to international and national non-governmental organizations, research and management institutions, as well as local communities. Through its regional Project Coordination Unit (PCU) and national Project Management Units (PMU's), the project works closely with ICRAF, IUCN, and WWF in the implementation of field activities, as well as with National Coordination Units (NCUs) of its African Development Bank (AfDB)/NDF supported PRODAP partner project.

### Stress Reduction Results

Demonstration projects to pilot the implementation of the SAP have been established in each of the four riparian countries. The project works closely together with the National Institute for Environment and Nature Conservation (INECN) and the Municipal Technical Services (SETEMU) in Burundi, as well as with the Lake Tanganyika Basin Water Office, Kigoma Urban Water Authority (KUWASA) and Kigoma/Ujiji Municipal Council (KUMC) in Tanzania to ensure participatory implementation of activities relevant to pollution control and water quality monitoring.

One of the expected outcomes of the project is improved water quality at identified pollution hotspots in Bujumbura (Burundi) and Kigoma (Tanzania). The total budget for pollution control in Burundi and Tanzania is \$13.73 million (including \$10.86 million co-financing from AfDB/NDF). Baseline data is available, but it remains too early to document stress reduction yet.

Demonstration sites for sustainable catchment management have been established in DR Congo (6 sites), Tanzania (6 sites), and Zambia (11 sites). Farmers are actively involved in the development and endorsement of land use plans for the demonstration sites. Capacity building is ongoing using targeted training sessions, resulting in an increasing number of households that are practicing sustainable land use. Furthermore, the project is successfully engaging stakeholders in alternative income generating activities aimed at reducing environmental stress.

The total budget for sustainable catchment management in DRC, Tanzania and Zambia is \$9.94 million (including \$1.0 million for

- » Lake Tanganyika is the oldest (9-12 million years) and deepest (maximum 1,470 metres) lake in Africa;
- » It contains over 1,500 species, of which more than 50% are endemic, including many colourful cichlid fish, as well as snails, crabs, shrimps, sponges, and a unique freshwater cobra;
- » The lake is part of the Albertine Rift Valley ecoregion, encompassing several important wildlife refuges, including Gombe Stream, Mahale, and Nsumbu National Parks, and Rusizi Nature Reserve.

PRODAP funded by AfDB). Demonstration sites have been established in DRC (79,899 seedlings have been planted, covering an area of 32 ha) and Tanzania (over 160,000 seedlings planted, covering almost 100 ha), as well as Zambia (22.5 ha planted in community woodlots and 22 ha in individual woodlots). Since sustainable agriculture activities typically take multiple years to have an effect at the catchment level, it is too early to detect significant changes in the load of sediment that enters Lake Tanganyika.

### Environmental and Socioeconomic Status Results

The project is supporting the LTA in establishing a Regional Integrated Environmental Monitoring Programme that can contribute to long-term sustainable management of the Lake Tanganyika Basin. National and international partners have been identified, a needs assessment was conducted, and capacity building support has been provided for water quality monitoring through a partnership with UNEP and the Nanjing Institute of Geography and Limnology (NIGLAS). This programme will ensure a robust environmental status baseline is established from which future trends and improvements can be verified, and adaptive management practiced, as SAP implementation proceeds.

Project stakeholders are encouraged to diversify their livelihoods in an environmentally sustainable way while simultaneously increasing local per capita incomes. The process has recently started in DR Congo, where nine groups have been identified for participation in alternative income generating activities. In Tanzania, 144 groups were selected, and training on alternative income generating activities such as beekeeping is ongoing. In Zambia, 837 households are involved in alternative income generating activities such as beekeeping, aquaculture with native fish species, chicken farming, and vegetable gardening. The average annual income of women who participated in a revolving fund, that enabled them to diversify their livelihoods, has increased from \$157 to \$3,125.

# Reversal of Land and Water Degradation in Lake Chad Basin



Girl collecting sand from Lake Chad for brick manufacturing.

## INFORMATION BOX

**Scope:** Regional

**Countries:** Cameroon, Chad, Central African Republic, Niger and Nigeria

**Partners:** GEF, World Bank, Lake Chad Basin Commission, UNOPS, IUCN

**GEF Grant:** \$10.294 million

**Co-Finance:** \$9.329 million

**Project Cost:** \$19.623 million

**Project website:** <http://www.lakechadbasin.net/>

## Project Context

Lake Chad Basin has strategic importance in Africa, covering about 8% of the surface area of the continent, and shared between the countries of Cameroon, Central African Republic (CAR), Chad, Niger and Nigeria, Sudan, Algeria and Libya. Five of these countries – Niger, Nigeria, Chad, Central African Republic and Cameroon – are members of the Lake Chad Basin Commission (LCBC) whose aims are to regulate and control the use of water and other natural resources in the basin and to initiate, promote, and coordinate natural resource development projects and research. For about four decades recurring droughts, plus a general decline in rainfall, and degradation of the vegetation cover, have led to drastic changes in the environmental conditions of the Lake Chad Basin. The resultant drying up of Lake Chad, the encroachment of the desert, and the decline of agriculture, livestock and fisheries, threaten the social and economic well-being of the over 22 million people living in the Lake Chad Basin.

The GEF project was designed to achieve the following three specific objectives: (i) build capacity within the Lake Chad Basin Commission (LCBC) and its national committees related to success in its mandate of managing land and water resources, (ii) enhance policy initiatives and transboundary institutional mechanisms to ensure that the member countries jointly develop and manage the Lake Chad Basin's resources, (iii) conduct a Transboundary Diagnostic Analysis (TDA), iv) implement pilot demonstration projects, v) prepare and adopt a Strategic Action Programme (SAP) for sustainable management of the Basin and vi) mobilise increased donor interest/support for implementing the SAP.

## Threats and Causes

The Lake Chad TDA determined that Lake Chad is facing several major threats including: (i) the variability of hydrological regime and fresh water availability in the basin leading to a decrease in the lake's area by 95% from 1963 to date; water pollution and river sedimentation; loss and modification of ecosystems; overexploitation of plant and animal resources; excess use of agrochemicals (especially for cotton and rice cultivation); and invasive species including typha grass, water hyacinth and quelea birds. The TDA identified several root causes of the priority transboundary problems including: (i) the absence of sustainable development on the political agendas of the riparian countries, (ii) low standards of environmental education and awareness, (iii) lack of integrated sectoral development planning and management, iv) insufficient public funding for environmental management; (v) population pressure, and vi) poverty/ low living standards.



## Results Delivered

### Process Results

A comprehensive Transboundary Diagnostic Analysis (TDA) was completed at national and regional levels. The TDA analysis was conducted through a participatory process and presents the transboundary problems as identified and prioritised by Basin stakeholders. Based on the findings of the TDA, the Strategic Action Programme (SAP) was completed and adopted as a regional policy framework for the integrated management of the Lake Chad Basin, with a framework, timeline and Financing Plan for implementation of priority activities. The SAP was endorsed by the Council of Ministers in June 2008, but the Investment Plan for SAP implementation was not developed within the duration of the project. National teams also developed National Action Plans for the implementation of IWRM within the framework of the SAP.

Pilot project activities provide opportunities for stakeholder involvement and lessons on land and water management practices for inclusion in the NAPs and SAP. Catchment Management Plans (CMP) for integrated natural resources management were prepared and adopted for the Chari-Logone Basin, Lake Fitri and the Lake Chad Shorelines & Northern Diagnostic Basin. The CMP for the Komadugu-Yobe (K-Y) Basin was developed jointly with the K-Y Basin Project (IUCN-NCF) and the Joint Wetlands Livelihoods Project (DFID-funding). The cooperation with these projects yielded a significant success in establishing a Water Charter for the Sustainable and Equitable Management of the K-Y Basin. A biodiversity study was also completed and a Regional Protected Area Strategy was approved by stakeholders and adopted by the countries.

With GEF project support, LCBC has been reformed, is operating more effectively and its capacity to sustainably develop LCB resources has been strengthened according to an Institutional Assessment (IA) that was prepared through the project and endorsed by the LCBC Council of Ministers in June 2008.

### Stress Reduction Results

Local priorities and initial SAP implementation were supported through 56 micro-grants to demonstrate environmentally sustainable approaches to reverse land and water degradation, as a basis for poverty alleviation. Common objectives of the microgrant projects included ensuring free flow of water to downstream users in Yobe and Borno States, Niger Republic and the Lake Chad; control of devastating floods affecting settlements and farmlands as a result of inappropriate reservoir operation upstream of the river; and others. Examples of microgrant activities include river channel desilting and tree cutting to clear blockages, construction of embankments and barrages to provide flood protection and early

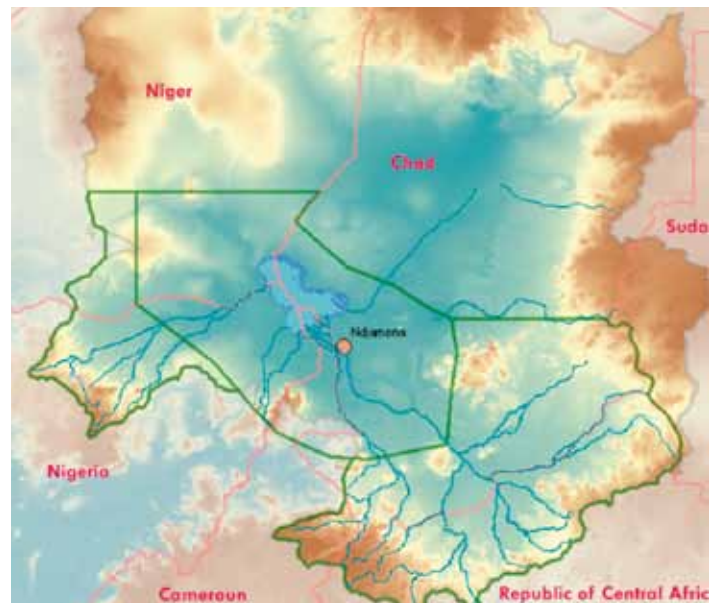
## FACT BOX

- » Lake Chad is economically important, providing water to more than 20 million people living in the four countries that surround it (Chad, Cameroon, Niger, and Nigeria) on the edge of the Sahara Desert;
- » The lake is home to more than 44 species of algae and has large areas of swamp and reed beds;
- » A major concern of the lake is shrinkage from 25,000 km<sup>2</sup> to the present expanse of less than 3,000 km<sup>2</sup>;
- » The average depth of Lake Chad is only 1.5 metres;
- » Lake Chad is the remnant of a former inland sea, palaeolake Mega-Chad. At its largest, Lake Mega-Chad is estimated to have covered an area of 400,000 km<sup>2</sup>, larger than the Caspian Sea is today;
- » The Chari River, fed by its tributary the Logone, provides over 90% of Lake Chad's water.

warning system, river channel clearance and excavation, rehabilitation and construction of gauging stations, and others.

### Environmental and Socioeconomic Status Results

It remains too early in the stage of SAP implementation to document measurable improvements in ecosystem and water quantity and quality indicators for Lake Chad. A reasonably good baseline of environmental indicators has been established by the Lake Chad Basin Commission but clearly more work is required in this area to put in place a suitably robust environmental and socioeconomic status baseline from which to monitor and adaptively manage SAP implementation going forward.



Lake Chad Drainage Basin.

# Senegal River Basin Water and Environmental Management Project



*Micro gardening project for village women, a UNDP-GEF community-based micro-grant-supported activity in Karata, Sigui, Guinea. (GEF OMVS, 2004-2008).*

## INFORMATION BOX

Scope: Regional

Countries: Guinea, Mali, Senegal and Mauritania

Partners: GEF, World Bank, OMVS

GEF Grant: \$7.250 million

Co-Finance: \$39.330 million

Project Cost: \$46.580 million

Project website: <http://www.omvs.org/index.php> (French)

## Project Context

The Senegal River at 1,800 km is the second longest river in West Africa. Its river basin covers around 300,000 km<sup>2</sup> and is home to approximately 3.5 million people, 85% of whom live near the river. Population growth is high, partly due to immigration. The upper basin has remained largely an area of subsistence agriculture based on shifting cultivation. In the valley and the delta, traditional production systems (flood-recession cropping, livestock rising, fishing) exist side by side with the practice of modern irrigation using water pumped from the river. The river has two large dams along its course. Before they were built, the river had markedly different hydrological conditions. Fluctuations occurred seasonally in water level and quality, in addition to the annual or cyclic episodes of dry and wet conditions. These fluctuations, characterised by erratic flows and episodic inundation, prevented any single species from dominating the ecology and contributed to a diversity of habitats and species.

By contrast, construction of the dams, and their accompanying infrastructure, contributed substantially to making the ecosystem more uniform and provided the habitat for aquatic weeds and disease vectors. Current threats to the river's ecology stem mostly from existing and proposed irrigation and hydropower developments.

The objective of this project was to provide a participatory, strategic, environmental framework for the environmentally sustainable development of the Senegal River Basin and to launch a basin-wide cooperative programme for transboundary land and water management. The project was jointly implemented by UNDP, the World Bank, and Organisation pour la Mise en Valeur du fleuve Sénégal (OMVS) – the basin authority. The UNDP component included: training and workshops to strengthen national and local institutional capacity; community-based micro-grant-supported activities; and increasing the number of stakeholders and communities involved and trained in local and transboundary water resource management issues.

## Threats and Causes

The Transboundary Diagnostic Analysis (TDA) prepared for the Senegal River Basin identified five particularly urgent problems. They are: (i) land degradation and desertification; (ii) decreased water supply and degradation of water quality; (iii) proliferation of invasive species; (iv) prevalence of waterborne diseases; and (v) threats to biological diversity. The TDA identified the principal root causes underlying these problems including weak policies; lack of harmonised regulations; insufficient knowledge especially of groundwater resources; lack of proper land tenure and weak land use planning; gaps in data and information; lack of awareness; climate change; population growth; insufficient access to financing; human and institutional capacity gaps; poverty; and others

## Results Delivered

### Process Results

A key result of the project was the full incorporation of Guinea into the Senegal River Basin water resources management legal and policy framework. OMVS's Water Charter was ratified by the Guinean Parliament. As the Water Charter superseded existing national legislation, the legal framework of Guinea was reviewed and necessary adjustments were agreed, in order to align national legislation with the OMVS Water Charter, the future regional code of environment, and pertinent legislation in the other riparian countries. A Guinea national working group was endorsed at the ministerial level to oversee the alignment and harmonisation process that is well underway with all necessary revisions and improvements agreed upon through multi-sectoral national stakeholder meetings and supported by the Multi-Purpose Water Resources Development Project Adaptable Programme Loan (MWRD APL). The project therefore accelerated Guinea's full integration into OMVS – a crucial factor for better land and water resources management across the entire basin.

A comprehensive TDA was completed and validated and formed the basis for development of the SAP. Multidisciplinary teams at national and regional levels were strengthened and linkages to academic entities in the region were established and improved. As a result of the project, a fully completed TDA has been published and widely disseminated and detailed maps showing environmental conditions throughout the Senegal River Basin are now available.

Based on the findings of the TDA, the SAP was prepared following a broad participatory process. The SAP was reviewed and approved

### FACT BOX

- » The Senegal River Basin, covers 1.6% of the African continent and spreads over four countries;
- » The basin is shared by Guinea (11%), Mali (53%), Mauritania (26%) and Senegal (10%);
- » The river's three principal tributaries – the Bafing, the Bakoye and the Faleme – all originate in the Fouta Djallon mountains in Guinea and together produce over 80% of its flow;
- » Agriculture is the primary economic livelihood activity of Senegal River basin inhabitants, followed by fishing.

in the project's fourth year by the Senegal Basin Ministerial Council at the 59th Council Meeting in August 2008, thus receiving the highest political commitment. The document was published and disseminated on a wide scale.

### Environmental and Socioeconomic Status Results

Guinea's hydrology network in the upstream portion of the Senegal Basin has been fully assessed and upgraded to be compatible with the existing OMVS hydrology network. From just one operational hydrology monitoring station in this area prior to the project, there are now eight hydrological stations in Guinea, fully rehabilitated and an additional 11 stations were upgraded and equipped throughout the overall basin. As a result of the project, the upper basin of the Senegal River is now equipped with water quality measurement installations and a fully functional early warning system.



*Confluence of Bafing and Bakoye Rivers form the Senegal River near Bafoulabé, Mali.*

# Development of a Strategic Action Programme for the Nubian Shared Aquifer System



Major portions of the Nubian Aquifer lie deep below much of Egypt's desert.

## INFORMATION BOX

**Scope:** Regional

**Countries:** Chad, Sudan, Libya, Egypt

**Partners:** GEF, IAEA, UNESCO, Nubian Authority

**GEF Grant:** \$0.974 million

**Co-Finance:** \$0.808 million

**Project Cost:** \$1.782 million

**Project website:** <http://www.naweb.iaea.org/>

## Project Context

The Nubian Sandstone Aquifer System (NSAS) project addresses one of the largest shared aquifers in the world involving Chad, Egypt, Libya and Sudan. There is a growing population with demand from industry and agriculture for this resource - the only significant water resource available for much of the region. The importance of this aquifer is further underscored by the fossil nature of the water. The current understanding is that it is only marginally recharged and that the main source of water was from rainfall during the last ice age. The GEF Medium-Sized project was designed to identify the pressure on the aquifer and possible transboundary impacts that could result due to degradation of the aquifer water quantity or quality. This has been carried out using the TDA approach leading to a Shared Aquifer Diagnostic Analysis (SADA), accepted by all four countries. Central to the analysis for the SADA has been the development and testing of an updated model to understand transboundary impacts associated with aquifer utilisation in the four countries.

The SADA formed the basis for preparation of a regional Strategic Action Programme (SAP) aimed at addressing key shared problems, with the full cooperation of all countries and to be implemented under the auspices of the Nubian Joint Authority established by the four countries as a means of regional coordination. Prior to the formal finalisation of the SAP, civil and political unrest within the region delayed its expected ministerial endorsement. The final technical meeting (November 2011) involving all four countries and the Joint Authority accepted and approved the SAP and indicated that ministers from each country would endorse the SAP following the completion of the Project.

## Threats and Causes

The SADA identified the following key transboundary concerns: declining water levels related to abstractions; damage or loss of ecosystems and biodiversity linked to role of the aquifer at oases; and water quality deterioration from pollution (industry, agriculture and urban). The potential impacts of climate change and the need for adaptation in this arid region was also identified as a cross cutting issue affecting each of the above issues. Changes in groundwater regime were also initially considered as important but this was later considered to be a local problem following the modeling work conducted by the GEF Project. The SADA identified the root causes of these transboundary concerns as: population growth; weak regional and national water governance; and poverty.

## Results Delivered

### Process Results

SADA: Data gaps were identified and addressed in national and regional SADA reports. The current SADA is a working draft for national counterparts to build on in subsequent projects supported by GEF or nationally. These national and regional SADA reports provided key data and information for the development and completion of the SAP.

3-D Model: The 3-D model was complemented with appropriate training at the regional level. NSAS countries will be adapting this model to national programmes as projects are being formulated. It is foreseen that training will be needed at the national level and will be considered during the development of pilot projects, based on recommendations of the SAP.

SAP: Regional and National SAPs were completed, agreed and endorsed by the NSAS countries. Each of the Nubian states are now in the process of identifying pilot projects to be implemented nationally, to test and validate some of the approaches and recommendations from the SAP. The SAP focused on the role of the Joint Authority as a coordination mechanism and identified over 100 management actions (shared between one or more countries), addressing three main SAP Water Resources and Ecosystem Objectives:

- Water Resource / Ecosystem Objective 1: To manage the shared aquifer in a sustainable and equitable way for the benefit of the NSAS countries on the basis of joint regional planning in order to minimise negative effects within and between countries, anticipating the challenges including increasing population, needs of agricultural expansion, and climate change.
- Water Resource/ Ecosystem Objective 2: To mainstream environmental aspects in the integrated management of the NSAS to conserve dependent ecosystems and reduce the risk of loss/damage to biodiversity.
- Water Resource / Ecosystem Objective 3: To utilise the Nubian aquifer resources on a sustainable socio-economic development basis.

Legal and Institutional Frameworks: Four national reports on institutional frameworks within the countries were received and reviewed. The regional and national reports remain as drafts and an update on their status is pivotal to any future activities within the NSAS region. The NSAS countries have agreed at the final

### FACT BOX

- » The NSAS occupies about two million km<sup>2</sup> with an estimated volume of water of about 500,000 km<sup>3</sup> of which the recoverable resource is thought to be approximately 15,000 km<sup>3</sup>;
- » Nubian water resources over the last million years or so have been controlled by the more pluvial glacial and relatively arid interglacial periods. During the pluvial periods it is likely there were significant surface water bodies that provided recharge to the aquifer; whereas during arid periods (including the present time) there has been little or no recharge of the aquifer.

meeting with the PSC that this will be taken up at a later stage if and when a GEF SAP implementation project is proposed.

The regional body established to coordinate the NSAS, the Joint Authority, has been involved in the SADA and SAP development and many of the SAP actions relate to strengthening the Joint Authority and to building its capacity to further protect the aquifer enabling socio-economic development of the region and protection of the dependent ecosystems.

### Stress Reduction Results

The Medium-Sized project focused solely on process outcomes – TDA, SAP, modeling, establishing water quality and quantity status baseline, and did not feature any ‘upstream’ SAP implementation demonstrations due to limited financial resources. Stress reduction will begin to be realised as the countries embark on implementation of agreed commitments under the SAP.

### Environmental and Socioeconomic Status Results

The four riparian countries sharing the aquifer jointly endorsed the technical approach and results of the numerical model developed in this project, which allows them to use model results to document ‘baseline’ environmental conditions. As more hydrogeologic data becomes available in the future, changes in the quality and quantity of water - from an increased use of the aquifer or other anthropogenic activities - could be evaluated with respect to this baseline. In addition, the baseline will serve as a tool for ‘adaptive management’ of the Nubian regional and national Strategic Action Programs during implementation.

# Implementation of the Dnipro River Basin Strategic Action Programme



Releasing fingerlings of sturgeon in the Sozh river (Dnipro tributary, Belarus).

## INFORMATION BOX

**Scope:** Regional

**Countries:** Ukraine and Republic of Belarus

**Partners:** GEF, UNOPS, Bavarian State Ministry of Environment and Public Health; GEF Small Grants Programme in Ukraine; Norwegian Society of Engineers (TEKNA); Dnipro River Council in Ukraine

**GEF Grants:** \$9.035 million

**Co-Finance:** \$22.293 million

**Project Cost:** \$31.328 million

**Project website:** [www.undp-gef-dnipro.com](http://www.undp-gef-dnipro.com)

## Project Context

The objective of the current project is to begin implementation of the ministerially approved SAP via governance reforms and demonstration projects aimed at reducing transboundary persistent toxic substances from small/medium size industries discharging through municipal waste systems (Vodokanals) in the Dnipro River Basin.

The project addresses its objective through the implementation of four major components: conducting a series of pilot projects to introduce cleaner production methods to several medium sized industries discharging through municipal wastewater systems, including the development of sustainable financing mechanisms and local regulation and monitoring procedures; developing a comprehensive Transboundary Monitoring and Indicators Programme that will provide information on the status and progress of the SAP implementation programme to Dnipro Basin management bodies; facilitating the introduction of harmonised environmental legislation that will improve monitoring procedures, strengthen regulatory and legal frameworks including, inter alia, those governing cleaner technologies; and establishing key institutional and management structures within the wider SAP management bodies

## Threats and Causes

The Dnipro River basin TDA identified the following priority transboundary issues: chemical pollution, radionuclide pollution, eutrophication, loss/modification of ecosystems or ecotones and decreased viability of stocks due to contamination and diseases, flooding events and elevated groundwater levels, and modification of the hydrological regime. The root causes of these issues included ineffective national/regional policies and management plans, deficiencies in legislation, lack of adequate finance, lack of land tenure, historically unsustainable development, prevailing attitudes which undervalue the environment, and the systemic socioeconomic crisis during period of transition to a market economy. Chemical pollution, particularly from industrial sources, was considered the priority issue in need of most urgent attention so this was determined to be the focus of the SAP implementation project. It was also considered a viable entry point for achieving reform as the industrial sector transitioned to market-based economy.

## Results Delivered

### Process Results

Transboundary Monitoring Programme (TMP) has been updated and modified in line with EU Water Framework Directive (WFD) requirements. TMP expeditions are

undertaken on an annual basis. Management decisions contain references to TMP data from the regularly updated TMP database. There is an annual exchange of TMP information between Dnipro Basin countries, and the National and Regional Working Groups are cooperating on a monthly basis. A TMP strategy was reviewed, updated and optimised, and a first draft Methodology on Ecological Status Assessment submitted. An NGO forum established in the first GEF project continues to function to facilitate civil society participation. Publications based on TMP environment data are available via the Internet on an ongoing basis, and are posted on the project website (<http://www.undp-gef-dnipro.com/>), governmental portals and the UNDP Ukraine website (<http://www.undp.org.ua/>). 12 EU Directives have been analysed and round table discussions conducted in 2011. The Dnipro Basin Agreement has been developed and submitted to the Governments of the Republic of Belarus and Ukraine and would serve as a river basin convention once adopted and ratified. SAP management bodies have been established and they meet on a semi-annual basis. Dnipro Basin countries have adopted project recommendations for inclusion in the TDA/SAP revision, resulting in an updated TDA/SAP. Information about SAP/NAP renewal and follow-up implementation is available in the media. Legal and institutional mechanisms for the introduction of water sharing principles in the Dnipro Basin have been developed. Drafts of the Dnipro Basin Management Plans compliant with the EU WFD are also underway. At least 10 awareness raising campaigns have been conducted, along with the release of 72 project publications.

### Stress Reduction Results

Enterprises in Ukraine and Belarus have been identified and undergone Cleaner Production (CP) training. 19 enterprises took part in the training, 11 of them were certified due to their successfully developed business plans. Technical assessments by international and local experts have started. Since 2009, a Transboundary Quality Assessment/Quality Control (QA/QC) system has been established. Tests are performed on a semi-annual basis with a focus on sustainability and cooperation between Ukraine and Belarus. A CP Programme is being implemented to reduce the concentration of Persistent Toxic Substances (PTS) in discharging waste waters. 11 enterprises have successfully drafted business plans, 15 enterprises are currently being trained and low cost measures will be implemented in the next reporting period. CP trainings are being delivered to at least 25 industrial enterprises, 12 local authorities and the wider public. CP trainings have been completed and 11 enterprises certified. Enterprises in Ukraine and Belarus have been identified and undergone CP training. It is expected that at least 15 enterprises will be subject to a range of co-financing instruments by the end of the project. 19 enterprises took part in the training in Dnipropetrovsk, Ukraine. Training sessions are ongoing in the city of Kyiv, Ukraine, where 12 enterprises are participating.

- » The total length of the Dnipro is 2 200 kilometres and it has a drainage basin of 509 000 square kilometres;
- » The average discharge of the Dnipro (at Kherson) is 1,670 m<sup>3</sup>/sec;
- » 57% of the Dnipro Basin lies in Ukraine, 23% in Belarus, and 20% in the Russian Federation;
- » The population of the Basin (2001) was about 32.4 million, including 3.6 million in Russia; 6.3 million in Belarus; and 22.2 million in Ukraine;
- » 564 reservoirs have been constructed in the Basin with a total area of 775.6 km<sup>2</sup> and a capacity of 46.2 km<sup>3</sup>.

Furthermore, 24 experts from the Ukraine and 20 experts from Belarus completed CP training courses in Germany. The number of industries implementing CP methods/technologies has increased by 50%.

### Environmental and Socioeconomic Status Results

Three scientific monitoring expeditions of the Dnipro Basin transboundary waters were recently undertaken. 23 monitoring stations were evaluated and 14 reference sites were determined. This assessment on the current ecological status was conducted on the basis of hydro-morphological, hydro-chemical and biological indicators. Based on extensive activities carried out during both GEF projects, a very robust environmental and water resources baseline for the Dnipro is now available which will facilitate long-term monitoring of status and trends in the environmental health of the river system and inform adaptive management during SAP implementation.



*First Transboundary monitoring mission of the Dnipro following the independence of CIS countries.*

# Integrating Multiple Benefits of Wetlands and Floodplains into Management of the Tisza River Basin



Upper Tisza near Yablunivka village, Ukraine © Alexi larochevitch.

## INFORMATION BOX

**Scope:** Regional

**Countries:** Ukraine, Slovak Republic, Romania, Hungary, Republic of Serbia

**Partners:** GEF, UNEP (Carpathian Convention Secretariat), International Commission for the Protection of the Danube River, European Union

**GEF Grant:** \$1.000 million

**Co-Finance:** \$1.300 million

**Project Cost:** \$2.300 million

**Project website:** [http://www.icpdr.org/icpdr-pages/tisza\\_undp\\_gef.htm](http://www.icpdr.org/icpdr-pages/tisza_undp_gef.htm)

## Project Context

The Project has worked closely with the Tisza countries (Ukraine, Slovak Republic, Romania, Hungary and the Republic of Serbia) and the International Commission for the Protection of the Danube River to develop an Integrated Tisza River Basin Management Plan (ITRBMP). This Plan is equivalent to a GEF Strategic Action Programme (SAP). The Project had a land/water management focus aimed at improving the use and protection of wetlands and floodplains to encourage further restorations of these important river basin features that have been lost due to intensive farming and flood protection. The Project undertook three pilot activities addressing land and water management in addition to the coordination of the ITRBM support.

## Threats and Causes

The Tisza Transboundary Diagnostic Analysis (TDA) identified the main threats to the Tisza Basin ecosystem as: nutrient pollution (mainly from agriculture); organic pollution (from insufficient wastewater treatment); hazardous substances (from industry, including mining); river engineering (from flood mitigation measures resulting in loss of wetlands and flood plains) and floods/droughts. In addition, the problems of inappropriate disposal of solid waste (e.g., plastic bottles) was highlighted and addressed as a priority transboundary problem. The principal root causes behind these priority issues included:

- Inadequate legislation, institutions and controls addressing organic pollution, nutrient pollution, hazardous substance pollution and the impacts of river engineering;
- Insufficient solid waste policies and practices;
- Inadequate approaches to integrated land and water management to minimise the impacts of floods and droughts.

## Results Delivered

### Process Results

The main focus of the Project has been to develop and seek adoption of a regional Integrated River Basin Management Plan for the Tisza Basin. The Plan (consistent with the GEF concept of a Strategic Action Programme and the requirements of the European Union's Water Framework and Floods Directives) developed regional strategies to address the key environmental problems impacting the aquatic ecosystem. The Plan went further than the current obligation on EU countries of the WFD by integrating issues of water quantity (including floods and droughts) with water quality management, while holistically addressing both land and water



management integration. The agreed plan was formally approved and adopted by the Ministers of Environment/Water Management from the five countries in Uzghorod (Ukraine) in April 2011. This ministerial meeting also reaffirmed national commitments to work together to implement the Plan which is a legal obligation in the three EU countries and a firm ministerial commitment (since 2000) in the non-EU countries. The plan sets clear objectives and deadlines for achieving 'good ecological status' and identifies joint measures to achieve these objectives. The data collected from the Tisza TDA was supplemented by practical experiences of land-water management pilot projects undertaken by the project that engaged local stakeholders, ensuring a wide acceptance of both the concepts of the Integrated Plan and the alternative methods for managing riparian zones, further strengthening the 'top-down' and 'bottom-up' approach for this project.

### Stress Reduction Results

In the last 150 years more than 80% of the natural floodplains and wetlands of the Tisza River Basin have been lost. The MSP undertook three pilot projects to supplement available information with a focus on integrated land and water management to encourage, by way of demonstration, a reconnection of former wetlands and improved use and management of floodplains. The key lessons of these pilot activities were included in the ministerially endorsed Integrated River Basin Management Plan. The three demonstration projects did achieve limited stress reduction through the pilots. For example, 6 km of restored riverbank and a restored mountain stream in Ukraine; in Slovakia the concept of 'making space for rivers' has gained acceptance by the national Ministry of Environment following limited restoration of floodplains and wetlands in the Bodrog Basin; and, through the development of a manual on Integrated Land Development, further stress reduction through improved management is expected. However, significant stress reduction will come through the expected reconnection of wetlands endorsed in the ITRBMP by the Ministers of the Tisza Basin – with 17,306 ha of wetlands identified with potential for reconnection. 2,651 ha are expected to be reconnected by 2015 and an additional 12,993 ha (Ukraine) are planned for reconnection by 2021.

An important pilot project also helped to reduce the problems of solid waste (plastic bottles) in the Tisza. Each year, Hungary removes over 300 tonnes of plastic bottles from the Tisza River originating from the upstream countries. The pilot project initiated a series of awareness programmes, joint trans-boundary community programmes and provided solid waste containers and assisted with recycling programmes. Working with parallel activities funded by Coca Cola, the project removed many tonnes of waste from riverbanks but more importantly generated an improved understanding of the value of the river, ensuring it was

- » At 966 km, the Tisza River is the longest tributary of the Danube and its basin (157,186 km<sup>2</sup>) is the largest sub-basin comprising 19.5% of the Danube Basin;
- » The Tisza is home to 14 million people throughout five countries – Ukraine, Romania, Slovakia, Hungary and Serbia;
- » The Tisza River Basin is an area rich in biodiversity, providing habitats for many species no longer found in other parts of Europe;
- » Past Tisza river engineering works have resulted in shortening of the original length of the Tisza River by 30%;
- » An estimated 87% of the original wetlands and floodplains in the Tisza Basin have been lost.

free from visible pollutants by local inhabitants. Plastic waste is a global issue that has received relatively little attention within the GEF IW community. Plastic waste also serves as a very visible indicator of pollution and solving the problem of inappropriate disposal may have additional benefits of reducing other pollutants and help to enhance an appreciation of the environment.

### Environmental and Socioeconomic Status Results

The Project has assisted with the identification of an environmental status baseline for the Tisza River Basin and in developing approaches to monitoring that will be undertaken through the implementation of the Integrated River Basin Management Plan. These indicators include:

- Identifying wetlands and floodplains with the potential for reconnection / restoration;
- Identifying agreed transboundary environmental monitoring locations and parameters to be assessed;
- Identifying and quantifying sources of organic, nutrient and hazardous substance pollution;
- Quantifying and identification of sources of plastic waste;
- Demonstrating approaches for flood risk and hazard mapping.

# The Caspian Sea: Restoring Depleted Fisheries and Consolidation of a Permanent Regional Environmental Governance Framework (CaspEco)



Matched Small Grants Programme (MSGP) Sturgeon Hatcheries Management, Rasht, Iran. This photograph belongs to CEP II – MSGP 2004.

## INFORMATION BOX

**Scope:** Regional

**Countries:** Azerbaijan, Islamic Republic of Iran, Kazakhstan, Russian Federation, Turkmenistan

**Partners:** GEF, EU, UNOPS, FAO, WB, UNEP, IAEA, BP, OSPRI and AGIP KCo

**GEF Grants:** \$19.789 million

**Co-finance:** \$78.227 million

**Project Cost:** \$98.016 million

**Project website:** [www.caspianenvironment.org](http://www.caspianenvironment.org)

## Project Context

This project builds upon a solid foundation for regional cooperation for Caspian environmental protection established by the five Caspian states: Republic of Azerbaijan; Islamic Republic of Iran; Republic of Kazakhstan; Russian Federation; and Turkmenistan, and the Caspian Environment Programme over a period of more than 10 years (1998-2011), with substantial catalytic support from the Global Environment Facility (GEF) through the United Nations Development Programme (UNDP), World Bank and United Nations Environment Programme (UNEP). The project's objectives are to strengthen regional environmental governance and apply new thinking to sustainable management and conservation of the Caspian Sea's bioresources. The project has applied a two-pronged approach to strengthening ecosystem-based management of aquatic bioresources, and strengthening regional environmental governance.

The key outcomes sought were: improved ecosystem-based aquatic bioresources management; invasive species mitigation; implemented policies and measures to increase reproductive success of Caspian's diadromous fish species; application of a circum-Caspian approach to habitat conservation; increased coastal communities' participation in bioresources conservation; operational and sustainable Tehran Convention institutions; coordination with other projects including effective donor coordination and engagement; implementation of the Strategic Convention Action Plan (SCAP) at regional level, and the National SCAP at national/sub-national level; enhanced stakeholders' engagement in the Tehran Convention process; and improved public access to information.

## Threats and Causes

Due to the cumulative impacts of unsustainable development practices, the Caspian Sea's ecosystem resilience has diminished over time. This has resulted from a number of drivers, including: overfishing; the separation of Caspian anadromous fish from their spawning rivers; introduction of invasive species of jellyfish (*Mnemiopsis ledyi*); input of POPs<sup>1</sup>/PTS<sup>2</sup> from agriculture; and chronic, low level pollution from oil exploration and exploitation. Collectively, these factors have caused dramatic depletion of Caspian sturgeon, herring, sprat and kilka stocks and associated declines in the livelihoods that depend upon these resources.

Fish stocks in the Caspian remain under threat due to inadequate enforcement against poaching; insufficient recognition and application of ecosystem-based approaches to fisheries management; genetic degradation of wild genotypes among fish; and the separation of anadromous fish from their natal river systems.

<sup>1</sup> persistent organic pollutants

<sup>2</sup> persistent toxic substances

*Mnemiopsis ledyi* is also believed to have impacted the cascading feeding interactions relied upon by kilka, resulting in a dramatic decline of kilka populations, a key food source for the Caspian seal. Beyond the kilka decline, the main factors contributing to depleted Caspian Seal population include a rise in juvenile seal mortality; hunting of pups on the winter ice; the accidental drowning of juveniles in fishing nets; and longer-term bio-accumulative effects of PTS/POPs on breeding females. Elevated levels of POPs and PTS have also been found in other long-lived species such as mollusk and sturgeon.

## Results Delivered

### Process Results

Drawing from commitments made under the GEF-supported Strategic Action Programme (SAP), the SCAP was endorsed, and the Biennial Convention Plan of Work (2009-2010 and 2010-2011) was implemented. In addition, each country developed a National SCAP and will establish an Inter-ministerial Coordination Mechanism for its implementation.

The region was also supported through a number of regional negotiations to finalise draft ancillary protocols to the Tehran Convention in several priority areas : (i) Protocol on Biodiversity Conservation; (ii) Protocol on Environmental Impact Assessment in a Transboundary Context; (iii) Protocol for the Protection of the Caspian Sea against Pollution from Land based sources of Pollution and Activities; and (iv) Protocol Concerning Regional Preparedness, Response and Cooperation in Combating Oil Pollution Incidents. The latter protocol was signed at the Third Conference of the Parties to the Tehran Convention in August 2011. The first three protocols are near completion and expected to be adopted at COP IV. New protocols on Environmental Monitoring and an Intergovernmental Agreement on Fisheries Management are underway.

The project strengthened regional bioresources management effectiveness and institutional capacity through establishment of four working groups: ecosystem-based management; fish spawning grounds; fish passages; and seals protected areas, comprising representatives from national fisheries and environment management institutions.

The CaspEco project, in cooperation with the Interim Secretariat of the Tehran Convention, facilitated the first ever regional meeting on Caspian bioresources management which included participation by each of the three key Ministries from each country: Foreign Affairs, Environment/Natural Resources, and Agriculture/Fisheries. Consensus was reached to promote development of a new inter-governmental fisheries' agreement.

- » The Caspian Sea is the largest enclosed body of water on earth with a surface area of 386,400 km<sup>2</sup>;
- » The surface of the Caspian Sea is about 26 metres below (ocean) sea level and has fluctuated by several tens of metres over recorded history;
- » The Caspian is a remnant of the ancient Tethys Sea which connected the Atlantic and Pacific Ocean 50-60 million years ago;
- » The northern section of the Caspian represents 25% of its surface area but only 0.5% of its volume due to very shallow depth;
- » The 5 largest rivers draining into the Caspian (in declining order) are the Volga, Kura, Terek, Ural and Sulak;
- » The Caspian features over 400 endemic aquatic taxa and 115 different species of fish; the Caspian Sea is one of only two freshwater seals found in the world (the other being in Lake Baikal).

### Stress Reduction Results

Regional collaboration on bioresources management and conservation is in its nascent stages. New analytical ecological models (Ecopath, Ecosym and Ecospace models) and decision support tools for ecosystem based bio-resources management were developed to help stakeholders better understand complex biological inter-relationships.

The Commission on Aquatic Bioresources (CAB), an inter-agency regional body involved in bioresources management and conservation in the Caspian established in 1992, is conducting joint research on bioresources and making decisions on utilisation of shared stocks, including sturgeon, kilka and seals.

11 Matched Small Grants Programmes (MSGPs), of up to \$50,000 each, were implemented at the coastal community level to reduce pressure on bio-resources including through small scale aquaculture; eco-tourism; eco-friendly agriculture practices, and innovative protected areas management. The MSGPs contributed to sustainable livelihoods at the community level and broadened stakeholder engagement in the implementation of the Caspian SCAP, and associated national plans. 21 Micro Environmental Grants Programmes (MEGs) were implemented, up to \$5,000 each, focused on NGO/CBO<sup>3</sup> capacity building, and environmental awareness-raising at the local community level.

<sup>3</sup> NGO: Non Government Organisation;  
CBO: Community Based Organisation

Results-based state-of-the-art management plans for the Kura River Delta Protected Area in Azerbaijan, and the Seal Special Protected Areas in Kazakhstan, were initiated for completion by 2011. The Circum-Caspian approach to habitat conservation i.e., the establishment of a network of Special Protected Areas of the Caspian Environment (SPACE), is awaiting finalisation of the Protocol on Biodiversity Conservation and its Annexes on Establishment of SPACE Network.

The Project implemented pilot projects to: improve existing salmon hatcheries efficiency including improving location choice and culture techniques; support the conservation and sustainable use of the sturgeon gene pool through a Gene Bank Pilot; compile a Caspian-wide salmon and sturgeon inventory; and conduct a fish passage assessment to develop pilot project proposals to submit to governments for rehabilitation of priority spawning areas to increase fish stocks and return on fisheries investment.

### Environmental and Socioeconomic Status Results

While it remains too early in the stage of SCAP implementation to detect measurable improvements in Caspian environmental amenities such as fish biomass, pollutant levels in sediments and

water, river access for anadromous fishes, improved livelihoods, etc., recent evidence suggests that the Caspian ecosystem is improving. Examples include: decline in extensive mass mortality of seals compared to 2002-2005; decline in anomalous algal blooms; decline in fish mortality reported compared to the past; coastal waters around Apsheron peninsula showing recovery from oil slicks; invasive *Mnemiopsis leiydi* population has declined; and Kilka fisheries are showing signs of recovery.

The three sequenced GEF projects, in cooperation with the Interim Secretariat for the Tehran Convention, have assembled a sizeable environmental and socioeconomic status baseline against which future status and trends can be monitored and adaptive, ecosystem-based management applied. These include the Caspian Biodiversity Information System, the Caspian Sea Information System, GIS Data, Interactive Caspian Sea Maps, Harmful Algal Bloom Monitoring System, and various other databases.



Matched Small Grants Program (MSGP) - Sturgeon Hatcheries Management, Rasht, Iran. This photograph belongs to CEP II - MSGP 2004.



*Third Meeting of the Conference of the Parties to the Framework Convention for the Protection of the Marine Environment of the Caspian Sea, 10-12 August 2011, Aktau, Kazakhstan.*



*Celebration of the Caspian Day in Aktau, Kazakhstan, 2011.*

# Implementation of the Rio de la Plata/Maritime Front Strategic Action Programme



FrePlata Satellite Image Photo showing Montevideo, Uruguay and Buenos Aires, Argentina.

## INFORMATION BOX

**Scope:** Regional

**Countries:** Uruguay, Argentina

**Partners:** GEF, CARP, CTMFM, Secretariat for Environment and Sustainable Development (SA y DS) of Argentina, Ministry of Housing, Land Planning and Environment of Uruguay (MVOTMA)

**GEF Grants:** \$8.860 million

**Co-Finance:** \$19.420 million

**Project Cost:** \$28.280 million

**Project website:** <http://freplata.org>

## Project Context

Located on the southeast South American shelf, the Rio de la Plata links the “La Plata Basin” (the second largest river in the continent and the fourth largest in the world) with the Atlantic Ocean. The Rio de la Plata and its Maritime Front (RPMF) constitute a transitional water system hosting significant biodiversity and whose resources are shared between the Republic of Argentina and the Oriental Republic of Uruguay.

The main urban centres of both countries are located within the project area, with a population of around 20 million people (35% in Argentina; 70% in Uruguay). Economic activities developed along the coastal area include agriculture, fisheries, industrial and port activities, and they generate most of the industrial GDP in the respective countries (65% in Argentina; 87% in Uruguay). RPMF plays an important role in the transportation system for Argentinian, Uruguayan and Mercosur<sup>1</sup> maritime exports.

## Threats and Causes

Extensive economic activities in both countries are particularly concentrated in the coastal areas of RPMF, generating transboundary environmental problems. Despite its sizeable flow (24,000 m<sup>3</sup>/s average) and coastal extension, the Rio de la Plata is showing stress from land-based pollution impacts, degradation of key habitats, and alteration of hydrological processes (sedimentation/erosion). During the last decade the economies of both countries have exhibited strong growth (7-9% p.a.) resulting in rapid urbanisation of coastal areas, with projected increased demand for water, sewer systems and solid waste disposal. Other environmental problems include the increase in toxic tides and the introduction of alien species.

## Results Delivered

### Process Results

The initial FREPLATA programme (2000-2008) pioneered a bi-national initiative in the region that concluded with a Transboundary Diagnostic Analysis (TDA) and a widely endorsed Strategic Action Programme (SAP) and its subsidiary National Action Programmes (NAP). The current (2009-present) FREPLATA GEF project is an opportunity to capitalise on these achievements to promote an integrated ecosystem approach for sustainable management of the RPMF. The project contributes to strengthening the institutional basis and cooperation frameworks for SAP implementation at all levels: bi-national commissions, national agencies with mandates over land-based activities, and local governments.

<sup>1</sup> Mercosur is a customs union coordinating the economies of Argentina, Brazil, Paraguay, and Uruguay.

Under the project structure, both countries have developed an effective institutional framework for inter-ministerial coordination. In the project Steering Committee, bilateral commissions (CARP and CTMFM) - formed under the Treaty of RPMF - and corresponding national environmental agencies are working at the highest political level to ensure sustainable implementation of NAPs through public policies and government programmes.

In both countries, the inter-jurisdictional commissions work to strengthen relations between the authorities at national, provincial and local (municipal/departmental) levels in order to harmonise standards and develop mechanisms for pollution control and prevention.

The project has established funding mechanisms to ensure long-term sustainability for its results. National institutions with responsibility for monitoring water quality of RPMF (Navy, environmental agencies, hydrographic services), and those related to environmental assessments (universities, fisheries) have agreed on a co-financing strategy for ensuring the monitoring programme and the information system of FREPLATA.

### Stress Reduction Results

Pilot projects are being implemented to enhance capacities and tools to prevent and mitigate pollution, especially at provincial and municipal levels. Pilots will allow quantifying the reduction of stress (point and non-point source pollution) in the RPMF.

Innovative platforms to enhance collaboration between public and private sectors (Public-Private Partnerships) are being promoted through Cleaner Production (CP) approaches through pilot projects testing reduction of toxic loads (point source pollution reduction) in RPMF with strong replication potential for upscaling throughout industrial sectors.

Others pilot projects in rural areas are being implemented to reduce nutrient discharges to key wetland protected areas. These include promoting good agricultural practices in dairy sectors adjacent to Santa Lucia wetlands (58,000 ha NPA (National Protected Area)) and innovative artificial wetland technologies for urban sewage treatment in Sanborombón Bay (224,000 ha NPA, Ramsar site). These pilot projects work closely with National Protected Areas Systems in both countries (SNAP, SIFAP), towards effective integrated management of coastal reserves.

The key stakeholders (industry, public service companies, universities) are involved in the implementation of CP to reduce point pollution loads in order to reduce environmental stress on the RPMF.

- » The Río de la Plata is about 290 km. long and has a total surface area of about 35,000 square km;
- » The depth of the Río de la Plata ranges from 1 to 25 metres from the inner fluvial to the outer estuary zone;
- » The Río de la Plata is a salt wedge estuary; saltwater, being denser than freshwater, penetrates into the estuary in a layer below the freshwater, which floats on the surface;
- » The rivers of the La Plata Basin carry an estimated 57,000,000 cubic metres of silt into the Río de la Plata each year;
- » The Río de la Plata was first explored by Europeans in 1516, when the Spanish navigator Juan Díaz de Solís traversed it during his search for a passage between the Atlantic and the Pacific Oceans.

Through inter-sectoral agreements between the municipal, provincial and national levels, public-private partnerships were established to advance treatment of wastewater effluents in San Clemente (pilot activity in Samborombón Bay). These partnerships between key stakeholders (authorities, researchers, NGOs) enable the linking of pilot activities with the Integrated Management Plan of Samborombón Wetlands (Ramsar site).

### Environmental and Socioeconomic Status Results

National and bi-national institutions are working to implement a sustainable Integrated Monitoring Programme and water quality indicators (physical, chemical, microbiological, biological) for the national exclusive jurisdiction and common use of the waters of the Río de la Plata. The objective is to provide updated information on the RPMF system to support decision-making and planning frameworks, including the bi-national monitoring programme.

Information generated in the monitoring programme (31 parameters), will enable continuous assessment of the quality of water and sediments, identify changes in pollutant levels, and assess the state of the environment of RPMF including anticipated environmental status improvements as investments in stress reduction continue.

Additionally, a mathematical model has been developed to understand the complex dynamics of hydrology and sediments in RPMF. The model will enable more accurate data interpretation, and predict trends and allow incorporation of climate change and variability in environmental status assessments.



*Oceanographic buoy used in the FrePlata Integrated Monitoring Programme.*



The previous two sections on LMEs and Rivers, Lakes and Aquifers, documented the effective application of the GEF's TDA/SAP methodology as a strategic planning tool to promote integrated management of large scale shared freshwater and marine ecosystems. TDA/SAP is arguably a more 'top-down' approach that facilitates regional and national governance reform and national investments, aimed at addressing agreed priority transboundary issues. In several of the marine and freshwater ecosystems where TDA/SAP has been applied, particularly in East Asia, the W/C Pacific Ocean, and the Wider Caribbean region, UNDP-GEF has complemented TDA/SAP with more bottom-up approaches to maintaining aquatic ecosystem services at smaller planning scales (municipalities, provinces, local watersheds) – Integrated Coastal Management (ICM) and Integrated Water Resources Management (IWRM).

Integrated water resources management is defined by the Global Water Partnership as a process which promotes the coordinated development and management of water, land and related resources in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. IWRM, often characterised by the three E's: economy, equity and environment, promotes water resources management at the level of watersheds, whether at local, national or transboundary scales. In essence, TDA/SAP represents application of the IWRM paradigm at a transboundary scale.

The objective of Integrated Coastal Management (ICM) is to increase the efficiency and effectiveness of coastal governance towards the sustainable use of coastal resources and of the services generated by ecosystems in coastal areas. It aims to do this by protecting the functional integrity of these natural resource systems while allowing economic development to proceed. The WSSD JPOA called for the "promotion of integrated coastal and ocean management at the national level and encouragement and assistance to countries in developing ocean policies and mechanisms on integrated coastal management." To date, well over 700 ICM programmes have been implemented in over 100 countries, driven in part by ICM being recommended for ocean and coastal management in key international frameworks such as UNCED/Agenda 21, UNFCCC, CBD, GPA/LBA and the Barbados Programme of Action for the Sustainable Development of Small Island States.

Given the very clear linkages between upstream watershed management and the welfare of downstream coastal ecosystems, the world's Small Island Developing States (SIDS) represent a special case for both IWRM and ICM which invites an integration of the two planning methodologies in what is often referred to as a 'ridge to reef' approach.

UNDP has been involved as a GEF Agency in a total of 14 IWRM/ICM projects and has cumulatively programmed \$85 million in GEF International Waters funding towards these ICM/IWRM programmes. This section reviews four project case studies from East Asia, the Pacific SIDS and the Caribbean SIDS. Each project has successfully applied and/or combined IWRM and ICM approaches to promote sustainable use of freshwater and coastal resources and maintenance of the livelihoods that depend on such resources. The Caribbean SIDS Integrating Watershed and Coastal Area Management (IWCAM) project probably represents one of the most advanced examples of integrating IWRM and ICM and provides numerous lessons and experience of value to the world's other SIDS.

# Integrated Water Resources and Coastal Area Management



# Implementing Sustainable Water Resources and Wastewater Management in Pacific Island Countries



Rainwater harvesting system helps communities in water scarce Pacific Islands such as the Marshall Islands.

## INFORMATION BOX

**Scope:** Regional

**Countries:** The Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu

**Partners:** GEF, UNEP, SOPAC, Pacific Alliance for Sustainability

**GEF Grant:** \$10.723 million

**Co-Finance:** \$89.580 million

**Project Cost:** \$100.303 million

**Project website:** <http://www.pacific-iwrm.org>

## Project Context

Pacific Island Countries (PICs) have a wide variety of island types ranging from the large, high volcanic islands, to tiny low coral atolls. Geographically, many of the island countries are small, low-lying and isolated which makes them vulnerable to climatic influences. Water governance and resource management strategies need to reflect this diversity. Capacity needs to be built to enable the effective management of land and water resources and ecosystems in a sustainable manner while sustaining livelihoods. The mitigation of the negative effects of land-based pollutants entering coastal receiving waters is also crucial to maintaining social and economic well-being. Water-related ecosystems and associated habitats are integral parts of island ecosystems.

This regional UNDP-GEF project covers 14 PICs and aims to contribute to sustainable development in the Pacific Island Region through improvements in natural resource and environmental management. The main project objective is to improve water resources and wastewater management and water use efficiency in PICs in order to balance overuse and conflicting uses of scarce freshwater resources through policy and legislative reform and implementation of applicable and effective Integrated Water Resource Management (IWRM) and Water Use Efficiency (WUE) plans.

## Threats and Causes

PICs already face serious water resource and environmental stress issues and serve as present day 'microcosms' of challenges that more and more continental countries are likely to face in coming decades. Combined with limited human and financial resources, PICs are faced with finding innovative, locally appropriate and adaptive solutions to address these challenges. Pacific Islands' surface water characteristics differ based on their geological formations, notably low-lying coral islands do not have fresh surface water. On many small coral and limestone islands, the basal aquifer takes the form of a 'freshwater lens' that underlies the whole island but varies in width and depth, and is easily over abstracted and polluted. Many of the Pacific Island Countries have low levels of access to safe drinking water and basic sanitation and the sub-region is considered one of the more behind on the water and sanitation MDGs. The region is highly vulnerable to general climatic factors such as El Niño and La Nina cycles and climate variability and change. Climatic change will impact on water availability including the potential threat of sea level rise to low-lying islands and coastal zones.

## Results Delivered

### Process Results

Two sub-regional Heads of State forums, the Micronesian Chief Executives Summit and the Melanesian Spearhead Group, have established Water and Sanitation Committees. 13 PICs (Cook Islands, Fiji, Federated States of Micronesia (FSM), Kiribati, Niue, Nauru, Palau, Republic of Marshall Islands (RMI), Tonga, Samoa, Solomons, Vanuatu and Tuvalu) have established national inter-ministerial water committees. IWRM principles have been incorporated into national strategic frameworks of three countries (Vanuatu, Kiribati and Solomon Islands), with continued development in seven countries (Samoa, Fiji, Cook Islands, Nauru, Niue, Tonga and Tuvalu) and being followed through other paths in three countries (FSM, Palau and RMI). In the three remaining PICs (FSM, Palau and RMI), the national committees have undertaken national water summits to launch water policy and legal reform processes directed by Presidential decrees. Forward looking National Outlooks for Water, Sanitation and Climate have been prepared for eight PICs (Solomons, Vanuatu, Cook Islands, Tonga, Nauru, Palau, FSM and RMI).

### Stress Reduction Results

A series of national demonstration projects are piloting IWRM approaches in each of the PICs through on-the-ground interventions. In Fiji, reforestation is ongoing in the upper Nadi Basin and similar efforts are underway with the Ngerikiil Catchment in Palau including zoning of protected areas. In Samoa, Apia Catchment reforestation and zoning to protect the upper catchment (and Apia's water supply) is underway, and a sewerage system upgrade has been completed for Apia. FSM is expanding its Protected Area reserves while in Vanuatu, scoping work on establishing a protected area in the Sarakata watershed is ongoing.

20 composting toilets have been installed in Tuvalu; Tonga and Nauru (schools) are installing similar systems with the Tongan system including sand filter and irrigation sanitation systems. Tonga is also commencing leak reduction scoping, including utility staff training and water loss estimations. In Majuro, Marshall Islands, the rehabilitation of septic systems and installation of pilot composting toilets is also planned and a water leakage reduction assessment is underway for RMI.

In the Cook Islands, nine household, communal and community ecotrench systems have been installed. Water leak reduction work is now completed in Niue and a water loss assessment is underway in the Solomon Islands.

## FACT BOX

- » For the PICs as a whole, only 53% of the population has access to an improved drinking water source and only 54% to improved sanitation; the proportion with access to safe water has actually declined since 2000 (55%) (Source: WHO/UNICEF Joint Monitoring Programme (JMP));
- » The Island of Ebeye in the Republic of the Marshall Islands has no fresh surface nor ground water and has a population density of 30,063 km<sup>2</sup> that is higher than the Indian city, Delhi (29,148 km<sup>2</sup>);
- » Majuro, the Capital of the Republic of the Marshall Islands, has a population density equivalent to Los Angeles and relies on water collected from its airport runway for 70% of its freshwater;
- » The Capital of Tuvalu, Funafuti, has no fresh surface or ground water and has a population density of 1,871 km<sup>2</sup>. To ensure each person has access to 50 litres of water per day, each person requires 5000 litres of water storage and 6 m<sup>2</sup> of catchment area (roof).

### Environmental and Socioeconomic Status Results

Each of the national demonstration projects will in time deliver improvements in environmental status including groundwater quality, increased forested area, reduced sediment burdens to coral reefs, reduced loads of nutrients and biochemical oxygen demand (BOD) to coastal areas, and others. In parallel, socioeconomic status improvements are expected due to increased access to safe water and sanitation, including improved health indices, reduced lost days at school due to water-related illnesses, and improved tourism and local fisheries revenue due to preservation of terrestrial and coastal ecosystem values. Each of these will be documented as the projects establish national IWRM baselines and monitoring systems. Efforts to reduce water loss should also result in reduced costs for water service providers which may be passed on to consumers.



Samoa watershed nursery.

# Implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA)



Mangrove Habitats in Quanzhou Bay, PR China.

## INFORMATION BOX

**Scope:** Regional

**Countries:** Cambodia, China, DPR Korea, Indonesia, Japan, Lao PDR, Philippines, RO Korea, Singapore, Thailand, Timor Leste, Vietnam

**Partners:** GEF, UNOPS, World Bank, ASEAN Centre for Biodiversity (ACB), Coastal Management Center (CMC), Conservation International (CI) International EMECS Center of Japan, International Ocean Institute (IOI), IOC Sub Commission for the Western Pacific (IOC WESTPAC), International Union for Conservation of Nature (IUCN), Korea Environment Institute (KEI), Korea Maritime Institute (KMI), Korea Ocean Research and Development Institute (KORDI), Northwest Pacific Action Plan (NOWPAP), Ocean Policy Research Foundation (OPRF), Oil Spill Response, Plymouth Marine Laboratory, PEMSEA Network of Local Governments, Sweden's Environmental Secretariat for Asia (SENSA), UNDP-GEF Small Grants Programme (SGP), UNEP Global Programme of Action for the Protection of Marine Environment from Land Based Activities (UNEP GPA), UNDP GEF Yellow Sea Project (YSLME)

**GEF Grants:** \$ 35.800 million

**Co-Finance:** \$ 61.078 million

**Project Cost:** \$ 96.878 million

**Project website:** [www.pemsea.org/](http://www.pemsea.org/)

## Project Context

The UNDP-GEF PEMSEA Regional Programme on Implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA) represents the latest in a series of three UNDP-GEF interventions that integrate local, national, sub-regional, and regional initiatives to address coastal and marine issues, with a focus on unsustainable rates of, and conflicts over, resource use and the associated social, economic and environmental impacts, such as habitat degradation, natural and man-made hazards, water use and supply management, food security, pollution reduction and waste management.

## Threats and Causes

In one of the most densely populated, rapidly developing and increasingly urbanised (mainly in coastal cities) regions in the world, the coastal and marine ecosystems of the East Asian Seas (EAS) region have been increasingly subject to varying degrees of overexploitation and pressure as a result of human activities. Even with the significant progress made by countries, individually and collectively in the region, ecosystem services continue to be degraded including biodiversity loss; degradation of habitats; fisheries' overexploitation; mismanagement and pollution of water; uncontrolled development and urbanisation of coastlines; climate change and variability; and other natural and man-made hazards.

## Results Delivered

### Process Results

The Sustainable Development Strategy for the Seas of East Asia (SDS/SEA) was adopted by 12 participating PEMSEA countries in December, 2003, in Putrajaya, Malaysia. The SDS-SEA was developed after three years of extensive consultations with the 12 participating governments and 16 stakeholder partners, and embodies a shared vision among stakeholders towards achieving the sustainable use of coastal and marine natural resources, protection of the ecosystems, protection of life and property of the coastal population and sustaining the benefits provided by marine ecosystems. Action programs are developed under six major strategies: Sustain, Preserve, Protect, Develop, Implement and Communicate. In 2009, the Agreement Recognizing PEMSEA's International Legal Personality was ratified by eight Country Partners: Cambodia, PR China, DPR Korea, Indonesia, Lao PDR, Philippines, RO Korea, and Timor Leste formalising PEMSEA's transformation into an independent legal entity tasked with coordinating and monitoring SDS/SEA implementation.

Building on the Putrajaya Declaration of Regional Cooperation for Sustainable Development of the Seas of East Asia (2003), the Haikou Partnership Agreement on SDS-SEA Implementation (2006) and the Manila Declaration on Strengthening the Implementation of ICM for Sustainable Development and Climate Change Adaptation (2009), in 2012 PEMSEA is working towards the adoption of sustainable ecosystem services for an ocean-based blue economy in the Seas of East Asia through the SDS-SEA implementation. To further strengthen the implementation of the SDS-SEA, PEMSEA developed national and regional SDS-SEA medium term plans (2011-2015) with specific targets and activities to be adopted in the Fourth Ministerial Forum in July 2012.

EAS countries have committed to three priority targets under the SDS-SEA: develop coastal and ocean policies, and supporting institutional arrangements in at least 70% of partner countries by 2015; adopt and implement Integrated Coastal Management (ICM) programmes covering at least 20% of the region's coastline by 2015; and prepare State of Coasts (SOC) reports, including climate change adaptation measures.

As of June 2011, coastal and ocean policies have been initiated in four countries; draft coastal and ocean policies are being developed in six countries (five with GEF funding), ICM coverage of the regional coastline has reached 10%, and the PEMSEA Network of Local Governments (PNLG) has adopted the SOC reporting system, committing 100% of its membership to implement the system by 2015.

In 2011, the EAS Partnership Council and the Executive Committee approved the following guidelines: the Port Safety, Health and Environmental Management (PSHEM) Code; the Port Safety, Health and Environmental Management System (PSHEMS) Development and Implementation Guideline; and the Guidebook on the State of the Coasts Reporting for Local Governments Implementing ICM. The PSHEMS is being rolled out in seven ports, co-financed by the port authorities, the GEF and the German Technical Cooperation (GIZ).

The 2009 EAS Congress had 1,480 participants, 100 exhibitors, 51 co-conveners/supporting organisations and 12 sponsors. The EAS Congress 2012 will be hosted by Changwon City, Republic of Korea. The PEMSEA Network of Local Governments (PNLG) for Sustainable Coastal Development adopted the Dongying Declaration on Building a Blue Economy through ICM (2011), committing to a 5-Year PNLG Strategic Action Plan to include certification of ICM sites in accordance with the PEMSEA ICM Code. A Corporate Social responsibility (CSR) Forum for Public-Private Partnerships (PPPs) in the Rehabilitation of Manila Bay was conducted in 2009, attracting 35 Manila Bay corporations. This was followed by a series

- » The mission of PEMSEA is "To build interagency, intersectoral, and intergovernmental partnerships for achieving the sustainable development of the Seas of East Asia";
- » PEMSEA's geographic coverage includes the 6 sub-regional seas of the East Asian region, including the Yellow Sea, East China Sea, South China Sea, Sulu-Sulawesi and Indonesian Sea, as well as the Gulf of Thailand. They are semi-enclosed with a total sea area of 7 million km<sup>2</sup>, a coastline of 234,000 km and a total watershed area of about 8.6 million km<sup>2</sup>;
- » The six Large Marine Ecosystems of the EAS region contains 30% of the world's coral reefs and mangroves; produces 40% of the world's fish catch and more than 80% of aquaculture;
- » For several countries in the EAS region, the contribution of the marine economy to the national economy exceeds 5 % and in two instances may reach 20%;
- » Since PEMSEA's inception in 1994, nine ICM demonstration sites and 20 ICM parallel sites have been established in the region.

of workshops on PPPs in support of the Implementation of the Manila Bay Coastal Strategy.

From 2008 to June 2011, 1,327 ICM practitioners and 195 Regional and National Task Force members attended five regional training



*Mobilising support for the Garbage Bank project, Sriracha municipality, Thailand.*

workshops, three sub-regional training workshops, and 34 national and sub-national workshops. ICM Learning Centres have now been established in China, Cambodia, Indonesia, Philippines and Vietnam.

### Stress Reduction Results

With PEMSEA now supporting piloting, replication and upscaling of ICM programmes in over 20 sites across 12 PEMSEA participating countries, a wide range of stress reduction is underway at sites already implementing their ICM strategies and initial commitments under SDS/SEA; below follows a few examples of some of the stress reduction being realised.

In line with the implementation of the Sihanoukville Coastal Use Zoning Scheme, the Preah Sihanouk province in Cambodia has established 18 protected area zones covering 2,201 ha of mangroves, seagrass and corals and establishment of a Protected Area in Kampong Smach (3,197 ha) of mangroves and mudflats is underway.

From 2008 to 2010, the Quanzhou (China) government began to restore native mangrove habitats in areas of Quanzhou Bay affected by an alien invasive plant, Smooth Cordgrass (*Spartina alterniflora*). 150 ha of *Spartina* was removed, complemented by restoration of 134 ha of mangroves. Since 2000, mangrove habitat has increased to over 500 ha in Quanzhou Bay, making it the largest mangrove habitat along the southeast China coast.

The Laguna de Bay-Pasig River-Manila Bay Watershed IRBCAM project has provided decision-makers with forecasts of total biochemical oxygen demand (BOD), nitrogen and phosphorus loadings in 58 sub-basins up to 2020. The project aims to strengthen investments in pollution reduction to eliminate hypoxia towards achieving the target of a “swimmable” Manila Bay.

To address sea-based pollution in the Gulf of Thailand, Cambodia, Thailand and Vietnam have worked jointly to strengthen and harmonise coastal oil spill sensitivity maps; sub-regional guidelines on the use of chemical dispersants for oil spills; and an information sharing system on oil spill response.

An improved and integrated disaster reduction, preparedness and response system has led to the reduction of hazard-induced damages in Xiamen. For example, the installation of Automatic Marine Water Quality Monitoring Buoys now provides vital daily forecasting and early warning information. The system provided up-to-date information during a 20-day red tide incident in 2008 resulting in no direct economic loss or personal injury and rapid implementation of Xiamen’s Emergency Response Plan Against Red Tide.

Development of an integrated macro-scale land and sea use zoning plan for the Manila Bay Area is focusing on different scenarios of sea level rise, flooding and storm surges as a consequence of climate change, variability and extreme events. The project delineated vulnerable coastal areas to be affected by one and two metre sea level rises and enhanced storm surges. In light of these scenarios, the project is identifying and costing zoning and adaptation options.

In Lao PDR, the Sedone Integrated River Basin Management Project has produced a Sedone River Basin Strategy for Sustainable Development (SRD-SDS) that includes an intergovernmental institutional mechanism, and a pilot-scale project which provides sanitation services to 3,000 households along the Sedone River.

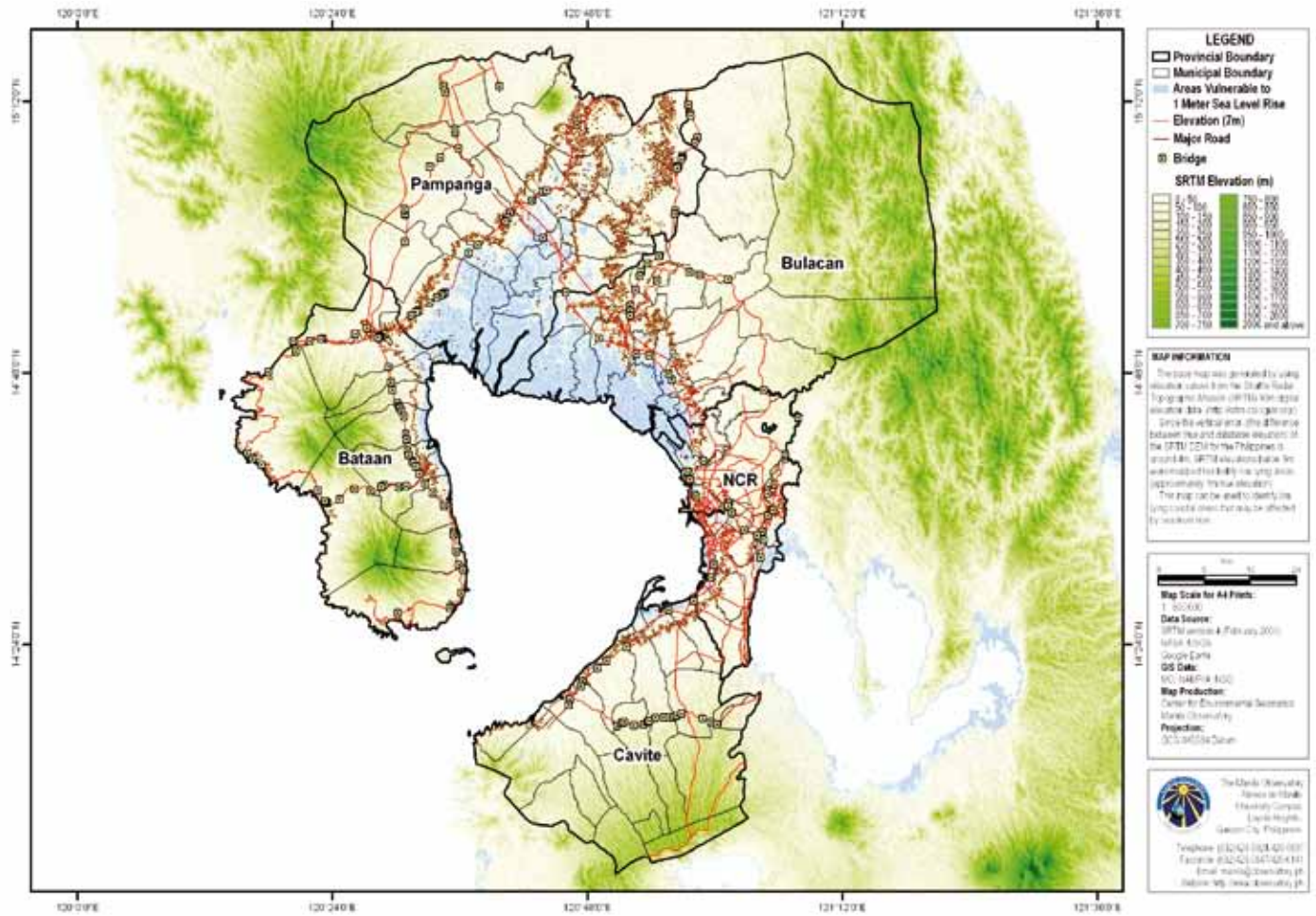
In Timor Leste, a baseline scoping project for the Alternative Livelihood Programme in Timor Leste was completed at ICM sites in Liquica and Manatuto, along with a rapid appraisal and baseline State of the Coasts (SOC) preparation. The scoping report identified capacity development activities and a proposed work plan for developing sustainable, asset-based and conservation-enabling livelihood development programmes. Two pilot sites: Ulmera and Maabat, were identified in Liquica and Manatuto, respectively, for sustainable livelihood demonstrations.

### Environmental and Socioeconomic Status Results

Environmental, social and economic benefits from investments in environmental facilities and services catalysed through PEMSEA ICM and other programs are only beginning to be monitored and documented at ICM sites through the implementation of PEMSEA’s State of the Coasts reporting system.

Xiamen, as one of the most advanced ICM sites, provides some initial data on environmental status improvements. A recent Xiamen case study indicates that domestic sewage treatment rose from 28% of the population in 1995 to 85% in 2007. Improvements in water quality in sea areas around Xiamen have been documented, particularly in Yangdong Lagoon where the transition was from heavily polluted waters to fishable waters. Other sea areas around Xiamen have been able to maintain their water quality despite substantial increases in population and economic development.

Map of Subic Bay, Philippines, showing areas vulnerable to 1 metre sea level rise due to climate change



Sedone Integrated Riverbasin Management Project Site, Lao PDR.

# Integrating Watershed and Coastal Area Management in Caribbean Small Island Developing States (IWCAM)



*Video Transect Data Collection in Buccoo Bay, Tobago.*

## INFORMATION BOX

**Scope:** Regional

**Countries:** Antigua and Barbuda, The Bahamas, Barbados, Cuba, Grenada, Dominica, Dominican Republic, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago

**Partners:** GEF, UNEP, Secretariat of the Cartagena Convention, Caribbean Environmental Health Institute, UNOPS

**GEF Grant:** \$14.390 million

**Co-Finance:** \$98.270 million

**Project Cost:** \$112.660 million

**Project website:** [www.iwcam.org](http://www.iwcam.org)

## Project Context

In the Caribbean Small Island Developing States, high population densities, combined with population growth, urbanisation and increased development, particularly residential and tourist resort development, have led to the contamination of underlying aquifers and surface water, and the deterioration of coastal water quality. Caribbean countries, recognising the need to address these issues, sought to mobilise human and financial resources, targeted at the root causes of environmental degradation. They were able to identify management and human resource challenges, as well as financial and technological issues that hampered sustainable development. A unique partnership was established between the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), the Global Environment Facility (GEF) and other partners that was able to address some of these challenges, through the Integrating Watershed and Coastal Areas Management (IWCAM) project.

The project's main objective was to strengthen the capacity of the participating countries to implement an integrated approach to the management of watersheds and coastal areas. The long-term goal is to enhance the capacity of the countries to plan and manage their aquatic resources and ecosystems on a sustainable basis.

## Threats and Causes

The coastal and marine ecosystems of the Caribbean are extremely fragile and vulnerable to human activities, especially those that take place on land. Regional and national actions are therefore needed to protect these vital marine resources and overall environmental and public health in the Caribbean. There is increasing recognition of the highly integrated and closely interlinked nature of watersheds and coastal areas in small islands and the need to develop a more sector-coordinated management approach, both at the national and the regional level, with a strong emphasis on an expanded role for all stakeholders within a participatory management framework. Also recognised are constraints to the development and implementation of such an integrated and sector-coordinated management approach in the absence of applicable and cost-effective solutions to many of the primary threats and their root causes at the grass-roots level.

## Results Delivered

### Process Results

The project reviewed policy, legislation and institutional frameworks for IWCAM across 13 countries. It supported policy reform, and institutional restructuring to address inter-sectoral collaboration (such as through the establishment of the



National Inter-Ministerial Committee on Water Management in St. Lucia). New policies are incorporating Integrated Water Resources Management (IWRM) approaches that, in the context of Caribbean SIDS, are being promoted as IWCAM. The linkages that exist between the management of watersheds and coastal areas, and the prevention or control of pollution of coastal areas, have been well established and acknowledged, through reference to national-level IWCAM activities at the highest policy-making levels.

Antigua and Barbuda has developed a water policy that considers IWRM approaches. Dominica has prepared an IWRM Policy and Cabinet briefings related to the Protocol Concerning Pollution from Land-Based Sources and Activities (LBS Protocol). St. Lucia has had its IWRM Roadmap endorsed by senior policy-makers, including Permanent Secretaries. St. Vincent and the Grenadines and Barbados are actively developing and/or implementing IWRM Roadmaps that are shaping IWRM planning. Cuba has established a legally mandated committee for the Integrated Management of Cienfuegos Bay. A toolkit for Harmonizing Laws and Institutions has been published and has supported IWCAM reforms, specifically the ratification of the LBS Protocol by the Bahamas.

Perhaps of greatest significance was the declaration of a National Capital Park on the island of St. Kitts. IWCAM facilitated the official designation of a sensitive well-field area (approximately 500 acres of land encompassing seven of the ten wells that withdraw water from the Basseterre Valley Aquifer) in the Basseterre Valley, St. Kitts and Nevis, as a national park under the National Conservation and Environmental Protection Act. This will protect a water source that provides 70% of the supply to St. Kitts.

The project resulted in the strengthening of Water Resource Management Agencies through university-level training, as well as through exchanges among participating countries (for example in relation to Water Information System development). Modernisation of legislation also took place. Regulatory measures were supported through the development and testing of an indicators' framework, along with building additional capacity to monitor environmental parameters, utilising both laboratory equipment and community-based approaches.

The component dealing with National Hotspot Diagnostic Analysis implemented actions that were aimed to promote IWCAM reforms at the policy, legislative and institutional level. The focus was on Haiti, St. Vincent, Grenada and Dominica, seeking to resolve hotspot issues and threats within targeted communities.

### Stress Reduction Results

Stress reduction was achieved primarily through the efforts of nine demonstration projects covering eight island states. Stress

- » From their beginnings on the western edge of Cuba to their completion at the southern tip of Trinidad, the 13 Caribbean islands span a distance of over 2,800 kilometres
- » The region comprises more than 7,000 islands, islets, reefs, and cays
- » About 39 million people inhabit the Caribbean SIDS
- » The watersheds and coastal areas of the Caribbean contain some of the world's most diverse and productive habitats, including mangroves, coral reefs, sea grass beds and river deltas.
- » Over 13% of the world's coral reefs are found in the Caribbean region.
- » Some 30% of these are considered to have been destroyed, or at extreme risk.
- » The region's coral reefs contain about 70 species of hard corals and between 500-700 species of reef-associated fish.

reduction measures included the treatment of domestic sewage and industrial wastewater through the installation of four domestic and one industrial constructed wetlands, resulting in 2000 m<sup>3</sup> of untreated effluent diverted from waterways. In St. Lucia, the constructed wetland succeeded in reducing pollution loading by 90%. In Tobago, the constructed wetland treats approximately 4,500m<sup>3</sup>/year of fish-processing wastewater. Antigua and Barbuda is applying the most appropriate domestic wastewater treatment technology in order to reuse treated effluent for irrigation. Approximately 20 households from a suburb of St. John's, Antigua along with a large supermarket and a resort hotel will be provided with sewerage connections in order to divert both domestic and commercial sewage from an ecologically sensitive salt pond into the newly constructed treatment plant which has a capacity of 90 m<sup>3</sup>/day (20,000 gpd).

Heavily contaminated waste oil (approximately 8,000 L/year) has been diverted from the major aquifer in St. Kitts using oil separators at a power plant for Basseterre. In Exuma Harbor, the Bahamas, systems have been put in place for collection, on-shore treatment and appropriate final disposal of wastewater from yachts that might otherwise have ended up in the marine environment.

The project also resulted in saving 16,000 m<sup>3</sup> per year of potable water by installing 31 rainwater-harvesting systems in St. Lucia. Cuba has applied methodologies for water re-use and recycling, agro-forestry, and soil conservation. These have resulted in tangible increases in income for farmers within the Cienfuegos

watershed demonstration area; wage increases averaged more than 200 Cuban pesos per month and more than 6,000 additional litres of milk were produced on agro-ecological farms, compared to the baseline year 2006. In Tobago, over 550 trees were planted as part of the reforestation effort in the Courland watershed and over 60,000 mangrove plants were used for reforestation in Haiti. The work in Haiti also saw the recovery of over 50,000 discarded plastic containers from the environment.

The Dominican Republic is applying techniques for cleaner production in the industrial sector. Mechanisms to reduce point source pollutants were identified and are being implemented in ten factories. So far, in these industries, a reduction of 1,338 m<sup>3</sup> per year of wastewater has been observed. This amount is expected to increase as more industries incorporate cleaner production mechanisms, such as recycling and reutilisation, into their processes. The Cleaner Production options will save these industries an estimated \$203,188 annually and reduce electricity consumption by 284,533 kWh/year (approximately 2% of total use at the industries). The resulting environmental benefits will be a reduction of 178,215 kg/year of CO<sub>2</sub> emissions and a reduction in water use of 1,407 m<sup>3</sup>/year (3% of current use).

## Environmental and Socioeconomic Status Results

Progress in relation to establishment and monitoring of environmental and socioeconomic status indicators was made in a number of countries, such as Jamaica, Cuba, Dominican Republic and Dominica. As many of the demonstration projects summarised above continue to reduce pollution loads to their respective sites, measurable improvements in environmental status (ambient pollution levels, habitat area, biodiversity indices, etc.) should become discernible. The component on regional and national capacity building and sustainability has built capacity to prepare project proposals, utilise bio-indicators, and manage coastal aquifers. Through such training, the project has further strengthened institutions at the national and regional level to sustain the efforts made during the life of the IWCAM project.

In Cuba, innovative technologies such as lombriculture and vermiculture, and a range of soil conservation measures, have increased agricultural yield whilst reducing organic waste. On two farms, there was an 800% increase in meat production, 67% in milk production and 130% in fruit and vegetable yields from the year 2006, resulting in improved livelihoods.



Schools get involved in restoration of the Lower Haina Watershed, Dominican Republic.



*Sustainable bountiful harvest on Sarduy Farm Cienfuegos Watershed, Cuba.*



*Pump-out boat provides service to visiting yacht, Elizabeth Harbour, Exuma, Bahamas.*

# Reducing Hypoxia and Eutrophication in Havana Bay through Innovative Approaches



View of the City of Havana, Cuba.

## INFORMATION BOX

Scope: National

Countries: Cuba

Partners: GEF, CITMA Havana Province Delegation, UNOPS

GEF Grant: \$4.039 million

Co-Finance: \$19.489 million

Project Cost: \$23.528 million

Project website: [www.undp.org/cu/proyectos/bahia.html](http://www.undp.org/cu/proyectos/bahia.html)

## Project Context

The GEF pilot phase project “Planning and Management of Heavily Contaminated Bays and Coastal Areas in the Wider Caribbean” (1995-1998) assessed the environmental status of Havana Bay, Cuba including levels and major sources of pollution in the Bay. One of the priority pollution issues was excess burdens of the nutrients nitrogen and phosphorus, primarily from untreated or insufficiently treated wastewater, leading to local eutrophication and hypoxic conditions in some parts of the Bay.

To begin to reverse the environmental degradation of the Bay and its watershed, the project explored pollution reduction solutions that led to the formulation of a follow-on to the GEF Project: “Demonstration of Innovative Approaches to the Rehabilitation of Heavily Contaminated Bays in the Wider Caribbean”. The project is fully aligned with regional, national, and sub-national development and environmental priorities and fell within GEF International Waters Operational Programme No. 10.

The overall project objective was to promote and facilitate environmentally sustainable development and management of Havana Bay, and to disseminate and promote replication of these strategies in other bays in Cuba and the wider Caribbean. The specific project objective was to demonstrate and promote replication of innovative technical, management, legislative, and educational approaches for reducing nutrient loads to the Bay and to the wider Caribbean.

## Threats and Causes

A priority issue in the Bay is the eutrophication of coastal and adjacent international waters, resulting from high discharges of nutrients, mainly from poorly or untreated sewage, agriculture, and industrial activities.

In particular, assessments carried out under the pilot phase project identified insufficient collection and treatment of wastewater as a primary cause of Havana Bay environmental degradation. A large number of settlements have untreated sewage discharging directly into Bay tributaries due to insufficient sewage networks and treatment facilities. The Luyano River basin was identified as the largest source of nutrient and biological oxygen demand pollutants to the Bay.

## Results Delivered

### Process Results:

An integrated action plan for the rehabilitation and management of Havana Bay and nearby coastal areas was developed, and is being implemented to promote the environmental rehabilitation of the ecosystem. Both GEF projects have contributed

to strengthening institutional and national regulations; regulations for the use and protection of Havana Bay were elaborated and harmonised with national standards. To finance sanitation investments, resolution 33/99 established an environmental tax on all entities located around the Bay, including ships, for the Bay's use and exploitation. The Bay, and its contiguous zone, was declared an area under the "Integrated Coastal Management Regime" that is developing a protection programme. 100% compliance has been achieved with the new regulation "Free from Waste", and an Oil Spill Contingency Plan for the Bay has been adopted.

In 1998, through the GEF intervention, the Executive Committee of the Council of Ministers created the "State Working Group (SWG) for Sanitation, Conservation and Development of Havana Bay". The SWG provides a unique forum with a mandate to integrally address all matters related to the rehabilitation of the Havana Bay and its watershed. In 2005, the Port Authority for Havana Bay was established in order to achieve efficient port administration.

CITMA's (Ministerio de Ciencia, Tecnología y Medio Ambiente) Havana City Delegation, along with seven scientific and environmental centres involved in research of the Bay, has increased its capacities (human, technical and institutional) since the beginning of the project, through training activities and exchange between national and foreign professionals. The main topics covered are: the management of international projects; incorporating knowledge on approaches, methodologies and experiences of GEF projects and other United Nations' agencies participating in the project; and information and knowledge of demonstrative and innovative technologies applied in the project.

The Integrated Strategy of CITMA for Havana Province was first designed in 1997 and subsequently updated and approved by the provincial government for the 2011-2015 period. New land use planning policies and regulations adopted for the Bay's drainage area have helped to (i) limit the increase of productive activities in urban space adjacent to the Bay, in order to limit direct atmospheric discharges; (ii) regulate the management of industrial and commercial buildings by improving the technology, health, hygiene, architecture and planning through the renovation, modernisation, and deactivation of sub-standard facilities; and (iii) limit the spread of existing industries into new areas by encouraging more efficient land use.

Havana Bay is also developing a comprehensive programme of environmental education. The educational activities link schools with official agencies, the community, society, and social organisations (e.g., Bay's Friends and Believe in Hope). Studies are being conducted on environmental perception to determine the needs of environmental education of different social groups. Education

- » The average residence ('turnover') time of water in Havana Bay is about 8 days;
- » Prior to the GEF project, Havana Bay received about 48,000 m<sup>3</sup> of wastewater per day, carrying around 4,800 kg nitrogen and 1,200 kg phosphorus;
- » More than half of these wastewater and nutrient discharges originate from the Luyano River Basin;
- » Approximately 70,000 people live within the Luyano River catchment area.

materials include audiovisual presentations, printouts, and environmental publications, including a newspaper "Journal Pelican of Havana Bay".

### Stress Reduction Results

Construction of the new Luyano River wastewater treatment facility, financed by the UNDP-GEF Project and the Cuban government, is scheduled for completion in 2013. Once completed and operational, the facility will reduce nitrogen and phosphorus loads to the river by 50-70% with corresponding improvements in Havana Bay water quality and contributing substantially to the overall ecosystem recovery effort. 80% of the sewage collector system for WTP Luyanó IV has been installed, solving storm water drainage problems.

Technological modernisation, deactivation, change of use, and relocation of pollution sources to the Bay has also taken place, including recycling of industrial waste. In total, industries in the area have progressively reduced their pollution by an estimated 50% or more.



*Cargo ship entering Havana Bay © Photonika | Stock Free Images & Dreamstime Stock Photos.*

A coastal harbour clean-up programme has been developed to include the collection of floating solids, hydrocarbons, ships' wastes, plus the removal of sunken vessels. A fixed barrier for oil retention on the coast by the refinery, and temporary barriers to retain floating solids in the rivers Luyanó and Martín Pérez, have also been installed.

Additional stress reduction measures include: the provision of oil-removal equipment to the Maritime Sanitation Company; implementation of a system that collects solid waste and raw materials in the port facilities; purchase of containers, trucks and stationary boxes for separate collection; and the closure of the Cayo Cruz landfill that was a source of pollutants to the Bay. Lastly, a project for the integrated management of land and forest resources in the tributary watershed to the Bay has implemented a reforestation programme which will help to reduce erosion and sediment run-off to the Bay.

### Environmental and Socioeconomic Status Results

As the above and other stress reduction measures have been completed, continuous improvement in the main indicators of environmental and ecosystem quality has been observed:

- Dissolved oxygen over the past five years has reflected an annual average concentration in surface water above 5.0 mg L<sup>-1</sup>, the minimum required for good quality coastal waters according to the International Standard for water use fishing NC 25:1999;
- Total suspended solids shows a significant decrease in the Bay, reporting concentrations below 100 mg L<sup>-1</sup> maximum value for good quality according to the mentioned standard;
- An overall decrease in petroleum hydrocarbon contamination in the ecosystem;
- Stabilisation and some modest initial reduction in nutrient concentrations in surface waters of the Bay;
- Sanitary and health conditions have improved in the communities of San Miguel del Padrón with the installation of a sewage collection system;
- In parallel with the reductions in contaminant levels noted above, coastal and marine biodiversity, and watershed forest cover are beginning to recover.

Despite the evident improvement and stability of the main indicators noted above eutrophication levels in the Bay remain high. It is expected that once the Luyanó River treatment plant is completed and starts operations, water quality will improve further as nitrogen, phosphorus and BOD releases to Havana Bay are further reduced.



*Nutrient removal reactors under construction for Havana Bay wastewater treatment facility.*

While a sizeable fraction of the environmental and water resource challenges the world faces in sustaining ecosystem services of marine and freshwater systems are transboundary in nature, in some cases the issues are truly global and require a global approach. These include long-lived and highly mobile persistent organic pollutants (POPs), certain heavy metals, ocean acidification, marine plastics pollution, pollution from ships, and aquatic invasive species.

UNDP-GEF is helping to reduce global POPs contamination through its POPs portfolio of 62 projects valued at \$136 million in GEF grants. These projects are helping to reduce releases of PCBs, DDT and other POPs pesticides, dioxins, and other chemicals from sources ranging from hospital waste to electrical equipment to anti-fouling paints. UNDP-GEF has in the past partnered with UNIDO in a very successful global project aimed at reducing releases of mercury used in artisanal gold mining (one of the largest global sources of mercury releases to waterways) through introduction of alternative mining technologies and practices.

Most notably, UNDP-GEF has partnered with the International Maritime Organization (IMO) of the UN in a 15-year programme, GloBallast, aimed at reducing the risks from transfer of invasive species via ship ballast water, one of the principal global vectors for aquatic invasive species transfer. The highly catalytic results and tremendous progress made by GloBallast in addressing the ship invasive species issue is highlighted in the first case study of this section.

Back in 1998, the GEF and its agencies recognised that many of the challenges facing the world's transboundary marine and freshwater systems, such as overfishing, conflicting water uses, pollution and habitat loss, were common across many of the shared waters systems the GEF was targeting for support in the International Waters focal area, as were the kinds of strategic approaches needed to address such issues. This led the GEF and its agencies to establish the GEF's first focal area-wide portfolio learning initiative, IW:LEARN, the International Waters Learning Exchange and Resources Network ([www.iwlearn.org](http://www.iwlearn.org)), which remains operational up to the present time. Over this period, IW:LEARN has piloted and refined a series of portfolio learning tools including technical support services, biennial GEF International Waters Conferences, project learning exchanges, targeted training and facilitating regional dialogues. By promoting knowledge and experience sharing across the entire GEF International Waters portfolio over the last 15 years, IW:LEARN has made an important contribution to overall global efforts to improve the management of transboundary systems, and is the subject of our final project case study.

UNDP-GEF has been involved as a GEF agency in 3 projects addressing global water/oceans issues and in 13 portfolio learning projects; UNDP-GEF has cumulatively programmed \$21 million in GEF grant resources to address global water and ocean issues, and has allocated \$24.6 million towards GEF International Waters portfolio learning.



## Global Programmes



# Global Ballast Water Management Programme (GloBallast)



Participants discussing ballast water management strategies at regional training in Accra, Ghana.

## INFORMATION BOX

**Scope:** Global

**Countries:** Argentina, Bahamas, Chile, Colombia, Croatia, Egypt, Ghana, Jamaica, Jordan, Nigeria, Panama, Trinidad and Tobago, Turkey, Venezuela, Yemen

**Partners:** GEF, IMO

**Regional Coordinating Organizations:** RAC/REMPEITC-Carib, REMPEC, RAC-SPA, IGCC/GCLME-RCU, SPREP, PERSGA, CPPS

**Other strategic partners:** Black Sea Commission, Census of Marine Life (COMI)/OBIS, CIESM, Global Invasive Species Programme (GISP), INTERTANKO, NEPAD, UNESCO-IOC, GEF-UNDP-UNOPS CaspECO Project, GEF-UNDP-UNOPS ASCLME Project, World Maritime University (WMU), IMarEST, International Ocean Institute (IOI), International Union for the Conservation of Nature (IUCN), WWF, International Chamber of Shipping (ICS), GIA members (past and present, including APL, BP Shipping, Vela Marine International, Daewoo Shipbuilding & Marine Engineering, Keppel Offshore & Marine), Interreg North Sea Ballast Water Opportunity Project, European Commission, Total Foundation, ASEAN-India Project, European Bank for Reconstruction and Development (EBRD)

**GEF Grants:** \$12.408 million

**Co-Finance:** \$26.190 million

**Project Cost:** \$38.598 million

**Project website:** [globallast.imo.org](http://globallast.imo.org)

## Project Context

GloBallast Partnerships is the second phase of a GEF-UNDP-IMO intervention to address the transfer of invasive alien species (IAS) by ships and their potentially detrimental effects on marine ecosystems, and associated livelihoods. The objective of GloBallast Partnerships is to assist countries to apply sustainable, risk-based mechanisms for the management and control of ships' ballast water and sediment, which is the main vector for transfer of IAS by ships. By promoting the uniform implementation of the 2004 IMO Ballast Water Management Convention, the aim is that all partnering countries can demonstrate a significant improvement in legal, policy and institutional structures, which will in turn reduce the risk of ballast water borne marine bio-invasions.

## Threats and Causes

The transfer of alien species can pose a severe threat to human health, the environment, economies and livelihoods that depend on healthy aquatic ecosystems. By establishing themselves in new environments, invasive species can outcompete and displace other species; impact fisheries, tourism and other marine sectors; damage infrastructure such as cooling intakes for thermal power plants; and cause local outbreaks of disease such as shellfish poisoning and cholera. The primary causes behind the IAS challenge include: 1) the international/cross-boundary character of shipping; 2) insufficient institutional/legal arrangements to address the ballast water problem; 3) lack of readily available, cost effective ballast water treatment technologies; 4) lack of awareness; 5) limited financial resources; and 6) poor/inconsistent regional cooperation. If not adequately addressed, these will continue to remain as barriers to the effective implementation of ballast water management measures.

## Results Delivered

### Process Results

The GloBallast Partnerships project has progressed significantly at all levels— a number of global tools have been developed to support the legal, policy and institutional reforms, and a number of training packages have been developed to build ballast water management capacity in target regions and countries. At a national level, countries involved in GloBallast Partnerships have prepared and in many cases adopted and are now implementing their national legal, policy and institutional reforms. Several beneficiary countries are close to ratification and implementation of the 2004 IMO Ballast Water Management Convention.

The project is also laying the foundation for a regional approach to ballast water/ invasive species issues. As a result of the GloBallast intervention, Regional Task Forces



(RTFs) have been formed in 14 developing sub-regions and Regional Strategies and Action Plans on ballast water control and management have been developed, involving more than 100 countries.

The Regional Strategies and Action Plans on Ballast Water Management developed by the GloBallast Regional Task Forces in all five focus regions (the South-East Pacific and Argentina, the Mediterranean, the Guinea Current LME, the Red Sea and Gulf of Aden, and the Wider Caribbean) are being presented to the regional environmental conventions, with one already adopted as a protocol (Lima Convention).

The project has mobilised significant co-financing from various sources, including IMO, with an impressive 1:3.6 ratio for cash co-financing. When in-kind contributions are included, the ratio increases to 1:9.5. This clearly shows the ownership of the project, and the issue, by the countries and the partners involved.

The GEF-UNDP IMO GloBallast intervention has also played a catalytic role in a major market transformation in the area of ballast water treatment technologies, a market projected to be worth over \$35 billion in the next 10 to 15 years. In addition to supporting research and development efforts and harmonisation of testing and approval procedures, the project has established a Global Industry Alliance (GIA) and formed a GIA Fund with contributions from industry (shipping and ship-building companies) to support project related activities.

As of November 2011, all Lead Partnering Countries (LPCs) have identified their Lead Agency and established a National Task Force, comprising public as well as private stakeholders. 9 of the 15 LPCs have finalized their National Ballast Water Management Strategies, and a further three are in the process of drafting the documents. The project is also doing extensive outreach to non-LPC countries through regional and national trainings, national workshops, as well as the transfer of knowledge from Pilot Countries (PCs) and LPCs. National workshops have been held in more than 20 PCs during the last 18 months, and several of these countries are in the process of establishing their National Task Forces and drafting a National Strategy.

Furthermore, 10 of the 15 LPCs have finalized or are in the process of finalizing their draft national Ballast Water Management legislation to support compliance monitoring and enforcement. As a consequence, all LPCs are progressing towards ratification of the Convention albeit at different stages of the process.

### Stress Reduction Results

This project focuses on catalytic support to global, national and regional governance reform and industry transformation and does

- » Shipping transfers account for approximately 90% of world trade but is also estimated to transfer 3 to 5 billion tonnes of ballast water internationally each year;
- » An estimated 7,000 different species are being carried in ship ballast water at any given time;
- » The annual economic impacts of aquatic invasives are estimated to be as much as US\$100 billion per year;
- » There are approximately 57,000 large, ballast containing ships that may need to comply with the new global Convention;
- » 75% of the 33 countries that have to date ratified the Convention have been involved in the GloBallast programme and its activities, underscoring the catalytic role of the GEF-UNDP-IMO intervention.

not engage in specific on-the-ground activities that directly deliver stress reduction (e.g. reduced ballast water invasions). However, the very high level of governance reforms that the project has facilitated at all levels, as well as the transformative impact of the programme on the shipping industry vis a vis creation of a ballast water treatment industry projected in the several tens of billions, underscores that, as increasing numbers of country and industry stakeholders continue to take action on ballast water management and treatment, the risks of invasive species transfers should start to dramatically decrease in the coming years. Once the global Ballast Water Management Convention comes into force (possibly as early as 2013), the global legal mandate – and ‘level playing field’ for the industry – should further accelerate implementation of ballast risk reduction measures through continued technology development and deployment.

### Environmental and Socioeconomic Status Results

An unfortunate reality of ballast-mediated invasions of alien species is that once a species is established in a new and ‘welcoming’ environment, it is virtually impossible to eradicate; this underscores the critical importance of preventing ballast invasions in the first place. Waterbodies that have already experienced important invasions, such as the Black and Caspian Seas and the US Great Lakes, already face degraded ecosystems due to the impact of these invasives. As such, the environmental and socioeconomic status results that this project seeks to deliver is maintenance of healthy aquatic ecosystem goods and services via the future prevention of successful invasions. One of the tools the project has developed and disseminated is methodologies for port baseline surveys (of aquatic species) against which possible invasions can be detected; continued application and upscaling of such tools will prove vital in remaining vigilant to ballast invasives as risk is incrementally reduced each year due to the steps summarised above.

# GEF IW:LEARN: Strengthening International Waters Portfolio Delivery and Impact



Participants in an IW:LEARN targeted workshop on stakeholder engagement, in Montevideo, Uruguay – December 2006.

## INFORMATION BOX

Scope: Global

Countries: Global

Partners: GEF, UNEP, World Bank, UNOPS, IFAD, UNESCO, UNU, IUCN, GWP

GEF Grants: \$14.948 million

Co-Finance: \$12.428 million

Project Cost: \$27.376 million

Project website: [http://www.iwlearn.net/abt\\_iwlearn](http://www.iwlearn.net/abt_iwlearn)

## Project Context

The Global Environment Facility's International Waters: Learning Exchange and Resource Network (GEF IW:LEARN) is a partnership now underway for almost 15 years, implemented jointly by UNDP, UNEP, the World Bank and the other GEF Agencies, to share knowledge and build the management capacity of the GEF International Waters (IW) portfolio of projects and partners. The objective of IW:LEARN is to enhance the efficiency and effectiveness of GEF IW projects to deliver tangible results. This is achieved via a line of signature services including: the IW:LEARN website ([www.iwlearn.net](http://www.iwlearn.net)); targeted training workshops; technical support services; portfolio-wide learning through the GEF Biennial International Waters Conference; global, regional and thematic dialogue processes; information synthesis and dissemination; support to online communities of practice; and an IW:LEARN help desk. The project's main objective is strengthened global portfolio experience sharing and learning, dialogue facilitation, targeted knowledge sharing and replication, in order to enhance the overall efficiency and effectiveness of GEF IW projects to deliver tangible results in partnership with other IW initiatives.

## Results Delivered

### Process Results

Results from the Terminal Evaluation of IW:LEARN's Operational Phase on achievement of the projects' objectives, sent to over 200 GEF IW practitioners in 2008, are as follows:

- To what extent has IW:LEARN strengthened Transboundary Water Management? 54% - significantly.
- Has the project facilitated learning and information sharing among GEF stakeholders? 59% - significantly, 29% - partly.
- Did the project effectively capture and disseminate the lessons from the IW projects? 40% - significantly, 33% - partly.
- Did project activities foster structured learning and efficient replication of lessons among the GEF projects and cooperating agencies? 25% - significantly, 44% - partly.
- Did the project enhance the technical capacity of the recipients? 45% - significantly, 36% - partly.

Feedback from GEF IW practitioners regarding contributions to Knowledge Management via [www.iwlearn.net](http://www.iwlearn.net) :

- 77.4% GEF IW project staff indicated they use [iwlearn.net](http://www.iwlearn.net) (March '09 survey), an increase of 8.4% from 2008;

- The IW:LEARN website has received 1.3 million hits – including 27,000 unique visitors – from more than 120 countries since it became operational.

## Portfolio-Wide Learning: Biennial GEF International Waters Conferences

The main objective of the GEF Biennial IW Conferences is to facilitate portfolio-wide experience sharing. They also solicit advice to GEF and its agencies from the IW project portfolio on key issues and assist in building participant capacity in strategic management and technical areas and encourage GEF IW projects to apply evolving GEF policies and procedures during implementation.

Participants in the 5th Biennial GEF International Waters Conference (IWC5) considered the event a success: it was directly applicable to their work functions; it allowed sufficient time for networking; it enhanced their understanding of results-based management; and it communicated strategies for mainstreaming climatic variability and change.

IW:LEARN recently completed the 6th GEF Biennial International Waters Conference, which convened over 328 stakeholders representing over 70 active GEF IW projects.

**Technical Support Services:** A website toolkit, training and technical support and a standard website template/hosting help projects develop websites to improve information management, as follows:

- 60% (115 out of 190 projects) of the GEF IW portfolio have websites, most of which are in compliance with the IW:LEARN website guidelines;
- More than two dozen active GEF IW projects are using the IW:LEARN website toolkit, an off-the-shelf website template and hosting service from the project;
- The project has launched a new communications platform aimed at serving portfolio subsets and eventually aimed at serving over a 1,000 GEF IW stakeholders;
- Over 30 GEF IW projects are now able to disseminate their news, information and events in a simple, easy-to-use fashion, whereas before a small fraction of the portfolio did this;
- Distance Learning Information Sharing Tool (DLIST) ([www.dlist.org](http://www.dlist.org)) connects 1,000s of stakeholders of the Benguela Current Large Marine Ecosystem. The concept was devised in workshops in 2001 in South Africa and Namibia.

**Project Learning Exchanges/Twinning Exercises** are multi-day/week interactions among GEF IW projects and learning

### GEF IW:LEARN BY THE NUMBERS:

- » Average number of unique website hits per month: 6,479;
- » Number of GEF IW portfolio-wide meetings conducted: 6;
- » Number of IWC attendees: 1,618 (IWC 1-6);
- » Number of Project Exchanges: 22 with 53 beneficiaries;
- » Number of Website Toolkits in operation: 26 active, 17 dormant or in preparation;
- » Number of IW Project Websites archived: 39;
- » Number training workshops held on IW Management Issues: 23 (including 2 project exchanges);
- » Number of training workshops held on Information and Technology issues: 15;
- » Number of people attending all workshops: 69.

exchange partners to address specific, pragmatic IW management challenges. Some 32 GEF IW projects have now taken part in twinning exchanges. Some catalytic outputs include:

- The IW Communications Manual drafted by and for GEF IW projects;
- Two targeted workshops on IWRM and Stakeholder Engagement in SE Europe, resulted in inputs to the development of the Lake Skadar stakeholder involvement plan;
- The Lusophone TDA-SAP exchange hosted by Brazil ANA resulted in a programme of collaboration between ANA and OKACOM.



UNDP-GEF Project Managers Parvin Farschi and Nico Willemse deep in collaboration at the 6th GEF Biennial International Waters- October 2011

**Targeted Training:** development and delivery of regional technical workshops to address common capacity building needs for groups of GEF IW projects and their partners included:

- 23 training workshops on IW management issues and 15 on information technology and management;
- 129 GEF IW projects have participated in IW:LEARN's workshops;
- A series of workshops on economic valuation of aquatic ecosystems that resulted in a proliferation of such initiatives across the GEF portfolio, including application of ecosystem valuation in decision making: (i) on proposed inter-basin transfers for Lake Chad; (ii) to environmental planning in the Nile Basin; and (iii) to challenge dam EIAs in the Volta basin.

**Regional Dialogue Processes** foster transboundary and south-south cooperation among projects and national partners within a geographic region. In one case, this resulted in the creation of conditions wherein the formerly conflicting states decided to endorse not one, but two GEF international waters projects (Dinaric Karst Aquifer project, and the Drin River basin project) as well as activities within the GEF Mediterranean Sea regional project. The political conditions would not have been in place were it not for this unique activity.

**Outreach, Information Capture, Synthesis and dissemination** serves to increase awareness, scalability, replication, impact, and sustainability of GEF IW investments. Production of knowledge-sharing materials includes multimedia products (Project Implementation Guide; LME DVD Turning the Tide), as well as targeted materials, such as GEF IW Experience Notes. These notes are case studies on lessons and best practice in GEF IW project implementation. Some 36 of them have been produced.



Participants of the 6th GEF Biennial International Waters Conference (329 in total) in Dubrovnik, Croatia – October 2011.

## ACRONYMS AND ABBREVIATIONS

<b>\$</b>	US dollar	<b>EAS</b>	East Asian Seas	<b>IMR</b>	The Institute of Marine Research
<b>ABNJ</b>	Areas Beyond National Jurisdiction	<b>EBRD</b>	European Bank for Reconstruction and Development	<b>IMTA</b>	Integrated Multi-Trophic Aquaculture
<b>ACB</b>	Asean Centre for Biodiversity	<b>EBSA</b>	Ecologically or biologically significant areas	<b>INECN</b>	National Institute for Environment and Nature Conservation
<b>ACEP</b>	African Coelacanth Ecosystem Programme	<b>ECOMAR</b>	Ecosystems of the Mid-Atlantic Ridge	<b>IOI</b>	International Ocean Institute
<b>ACLME</b>	Agulhas Current Large Marine Ecosystem	<b>EEZ</b>	Exclusive Economic Zone	<b>IOZ/ZSL</b>	Institute of Zoology/Zoological Society of London
<b>AfDB</b>	African Development Bank	<b>EIA</b>	Environmental Impact Assessment	<b>IPIECA</b>	The International Petroleum Industry Environmental Conservation Association
<b>ANA</b>	Agencia Nacional De Aguas	<b>EIS</b>	Environmental Information System	<b>ITRBMP</b>	Integrated Tisza River Basin Management Plan
<b>APL</b>	Global container transportation company	<b>EMECS</b>	Environmental Management of Enclosed Coastal Seas	<b>IUCN</b>	International Union for Conservation of Nature
<b>ASEAN</b>	Association of Southeast Asian Nations	<b>EPSMO</b>	Environmental Protection and Sustainable Management of the Cubango-Okavango River Basin	<b>IUU</b>	Illegal, unreported and unregulated fishing
<b>ATS</b>	Arafura and Timor Sea	<b>EU</b>	European Union	<b>IW</b>	International Waters
<b>ATSEA</b>	Arafura and Timor Sea Ecosystem Action Programme	<b>FAO</b>	Food and Agriculture Organization of the United Nations	<b>IWC</b>	International Waters Conference
<b>BBC</b>	British Broadcasting Corporation	<b>FSM</b>	Federated States of Micronesia	<b>IWCAM</b>	Integrating Watershed and Coastal Area Management in Caribbean Small Island Developing States
<b>BCC</b>	The Benguela Current Commission	<b>GCLME</b>	Guinea Current Large Marine Ecosystem	<b>IWRM</b>	Integrated Water Resource Management
<b>BCLME</b>	Benguela Current Large Marine Ecosystem	<b>GDM</b>	Green Development Mechanism	<b>JMP</b>	Joint Monitoring Programme
<b>BOD</b>	Biochemical oxygen demand	<b>GDP</b>	Gross Domestic Product	<b>JPDA</b>	Joint Petroleum Development Area
<b>BP</b>	British Petroleum	<b>GEF</b>	Global Environment Facility	<b>JPOA</b>	Johannesburg Plan of Action
<b>BSAP</b>	Biodiversity Strategy and Action Plan	<b>GIA</b>	Global Industry Alliance for Marine Biosecurity	<b>KEI</b>	Korean Environment Institute
<b>CAB</b>	Commission on Aquatic Bioresources	<b>GIS</b>	Geographic Information System	<b>km<sup>2</sup></b>	Square kilometre
<b>CAR</b>	Central African Republic	<b>GISP</b>	Global Invasive Species Programme	<b>km<sup>3</sup></b>	Cubic kilometre
<b>CaspEco</b>	The Caspian Sea: Restoring Depleted Fisheries and Consolidation of a Permanent Regional Environmental Governance Framework	<b>GIZ</b>	German Technical Cooperation	<b>KMI</b>	Korean Maritime Institute
<b>CBD</b>	The Convention on Biological Diversity	<b>GPA-LBA</b>	Global Programme of Action to Protect the Marine Environment from Land-Based Activities	<b>KORDI</b>	Korean Ocean Research and Development Institute
<b>CBO</b>	Community Based Organisation	<b>gpd</b>	gallons per day	<b>KUMC</b>	Kigoma/Ujiji Municipal Council in Tanzania
<b>CenSeam</b>	Global Census of Marine Life on Seamounts	<b>GWPP</b>	Global Water Partnership	<b>KUWASA</b>	Kigoma Urban Water Authority
<b>CI</b>	Conservation International	<b>ha</b>	Hectare	<b>LCBC</b>	Lake Chad Basin Commission
<b>CITMA</b>	Ministerio de Ciencia, Tecnología y Medio Ambiente	<b>IAEA</b>	International Atomic Energy Agency	<b>LME</b>	Large marine ecosystem
<b>CMC</b>	Coastal Management Centre	<b>IAS</b>	Invasive alien species	<b>LPC</b>	Lead Partnering Countries
<b>CMP</b>	Catchment Management Plan	<b>ICAM</b>	Integrated Coastal Area Management	<b>LTA</b>	Lake Tanganyika Authority
<b>COMI</b>	Coastal and Ocean Management Institute at Xiamen University	<b>ICM</b>	Integrated Coastal Management	<b>m</b>	Metre
<b>COP</b>	Conference of the Parties to the Tehran Convention	<b>ICRAF</b>	The World Agroforestry Centre	<b>m<sup>3</sup>/sec</b>	Cubic metres per second
<b>CP</b>	Cleaner Production	<b>ICS</b>	International Chamber of Shipping	<b>MDGs</b>	Millennium Development Goals
<b>CPPS</b>	The Permanent Commission for the South Pacific	<b>IFAD</b>	International Fund for Agricultural Development	<b>MEDA</b>	Marine Ecosystem Diagnostic Analysis
<b>CSR</b>	Corporate Social Responsibility	<b>IGCC</b>	Interim Guinea Current Commission	<b>MEGs</b>	Micro Environmental Grants Programmes
<b>DFID</b>	Department for International Development	<b>IKM</b>	International Knowledge Management	<b>MPA</b>	Marine Protected Area
<b>DPRK</b>	Democratic People's Republic of Korea	<b>IMC</b>	Inter-Ministerial Committees	<b>MSGPs</b>	Matched Small Grants Programmes
<b>DRC</b>	Democratic Republic of the Congo	<b>IMCC</b>	Inter-Ministerial Coordinating Committees	<b>MSIOA</b>	Multi-Sectoral Investment Opportunity Analysis
<b>EAF</b>	Ecosystem approach to fisheries	<b>IMO</b>	International Maritime Organization	<b>MWRD</b>	APL Multi-Purpose Water Resources Development Project Adaptable Programme Loan

<b>NAP</b>	National Action Plans	<b>QA/QC</b>	Quality Assessment/Quality Control	<b>UNCED</b>	United Nations Conference on Environment and Development
<b>NBA</b>	Niger Basin Authority	<b>RAC-SPA</b>	The Regional Activity Centre for Specially Protected Areas	<b>UNDP</b>	United Nations Development Programme
<b>NBO</b>	Niger Basin Observatory	<b>RAC/REMPEITC-Carib</b>	Regional Activity Centre/The Regional Marine Pollution Emergency Information and Training Centre for the Wider Caribbean	<b>UNEP</b>	United Nations Environment Programme
<b>NCAP</b>	National Caspian Action Plan	<b>RCU</b>	Regional Coordination Unit	<b>UNEP GPA</b>	UNEP Global Programme of Action for the Protection of Marine Environment from Land Based Activities
<b>NCF</b>	Nigerian Conservation Foundation	<b>REDD+</b>	Reducing Emissions from Deforestation and Degradation	<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organization
<b>NDF</b>	Nordic Development Fund	<b>REMPEC</b>	The Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea	<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>NERC</b>	Natural Environment Research Council	<b>RMI</b>	Republic of Marshall Islands	<b>UNFSA</b>	United Nations Straddling Fish Stocks Agreement
<b>NGO</b>	Non Government Organisation	<b>RPMF</b>	The Rio de la Plata and its Maritime Front	<b>UNU</b>	United Nations University
<b>NIGLAS</b>	Nanjing Institute of Geography and Limnology	<b>RSC</b>	Regional Scientific Committee	<b>VME</b>	Vulnerable marine ecosystems
<b>NIOZ</b>	The Royal Netherlands Institute for Sea Research	<b>RTF</b>	Regional Task Force	<b>WB</b>	World Bank
<b>NOAA</b>	National Oceanic and Atmospheric Administration	<b>SADA</b>	Shared Aquifer Diagnostic Analysis	<b>WCPCF</b>	Western and Central Pacific Fisheries Convention
<b>NORAD</b>	The Norwegian Agency for Development Cooperation	<b>SAIAB</b>	The South African Institute for Aquatic Biodiversity	<b>WFD</b>	Water Framework Directive
<b>NOWPAP</b>	Northwest Pacific Action Plan	<b>SAP</b>	Strategic Action Programme	<b>WHO</b>	World Health Organization
<b>NPA</b>	National Protected Areas	<b>SCAP</b>	Strategic Convention Action Plan	<b>WIO</b>	Western Indian Ocean
<b>NSAS</b>	The Nubian Sandstone Aquifer System	<b>SDAP</b>	Sustainable Development Action Plan	<b>WIOSEA</b>	Western Indian Ocean Sustainable Ecosystem Alliance
<b>OBIS</b>	Ocean Biographic Information System	<b>SDS-SEA</b>	Sustainable Development Strategy for the Seas of East Asia	<b>WMU</b>	World Maritime University
<b>OFMP</b>	Pacific Islands Oceanic Fisheries Management Project	<b>SEG</b>	Stakeholder Engagement Group	<b>WSSD</b>	World Summit on Sustainable Development
<b>OKACOM</b>	Permanent Okavango River Basin Commission	<b>SENSA</b>	Sweden's Environmental Secretariat for Asia	<b>WUE</b>	Water Use Efficiency
<b>OMVS</b>	Organisation pour la Mise en Valeur du fleuve Sénégal	<b>SETEMU</b>	Municipal Technical Services in Burundi	<b>WWF</b>	World Wildlife Fund
<b>OPRF</b>	Ocean Policy Research Foundation	<b>SGP</b>	UNDP-GEF Small Grants Programme	<b>YSLME</b>	Yellow Sea Large Marine Ecosystem
<b>ORASECOM</b>	Orange-Sengu River Basin Commission	<b>SIDS</b>	Small Island Developing States		
<b>OSPRI</b>	Ocean State Policy Research Institute	<b>SIFAP</b>	Federal System of Protected Areas		
<b>PAH</b>	Polycyclic Aromatic Hydrocarbon	<b>SIODFA</b>	Southern Indian Ocean Deepsea Fishers' Association		
<b>PC</b>	Pilot country	<b>SIOFA</b>	South Indian Ocean Fisheries Agreement		
<b>PEMSEA</b>	Partnerships in Environmental Management for the Seas of East Asia	<b>SNAP</b>	National Protected Areas System		
<b>PERSGA</b>	The Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden	<b>SOC</b>	State of Coasts		
<b>PIC</b>	Pacific Island Country	<b>SOPAC</b>	South Pacific Applied Geoscience Commission		
<b>PIPP</b>	Priority Investment Portfolio Project	<b>SPACE</b>	Special Protected Areas of the Caspian Environment		
<b>PNA</b>	Parties to the Nauru Agreement	<b>SPC</b>	Secretariat of the Pacific Community		
<b>PNLG</b>	PEMSEA Network of Local Governments	<b>SPREP</b>	Secretariat of the Pacific Regional Environment Programme		
<b>POPs</b>	Persistent organic pollutants	<b>TDA</b>	Transboundary Diagnostic Analysis		
<b>PPPs</b>	Public-Private Partnerships	<b>TEKNA</b>	Norwegian Society of Engineers		
<b>PRODAP</b>	Lake Tanganyika Integrated Regional Development Programme	<b>TMP</b>	Transboundary Monitoring Programme		
<b>PSHEMS</b>	Port Safety, Health and Environmental Management System	<b>TSDA</b>	Timor Sea Designated Authority		
<b>PTS</b>	Persistent toxic substances	<b>UN</b>	United Nations		





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