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January 2016
International Waters – Delivering Results

© United Nations Development Programme
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Designer: First Kiss Creative

Production: Graphics Services Bureau, Inc., New York, USA.

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FOREWORD



ADRIANA DINU

The earth's water and ocean ecosystems provide mankind with a wide range of both market and non-market ecosystem services, such as food, drinking water, recreation, transport, energy resources, minerals and climate regulation. 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, underscoring the urgency for taking immediate action to reduce stress on these ecosystems.

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 portfolio has been supporting groups of countries in their joint efforts to sustain the critical ecosystem services provided by many of the world's most significant transboundary lakes, rivers, aquifers and Large Marine Ecosystems (LMEs). To date, UNDP-GEF has supported over 100 countries in efforts to sustainably manage 13 LMEs, 13 river basins, six lakes and three aquifers. Over this period, the UNDP-GEF Water and Ocean Governance Team has cumulatively mobilised \$641 million in GEF International Waters grant resources in support of these initiatives.

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. For more detail on each methodology, and a series of case studies documenting their impacts, see the 2012 UNDP-GEF publication, 'Catalysing Ocean Finance: Volumes I and II'.

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 Indicators'. See page 7 for an overview of cumulative results

delivery across the entire UNDP-GEF International Waters portfolio since 1991. This results 'snapshot' documents the tremendous progress the portfolio has made in helping move some of the world's most significant shared waters systems on the path towards sustainability.

In September 2015, the international community completed a series of negotiations leading to the adoption of the Sustainable Development Goals (SDGs) by the United Nations General Assembly, setting a new 'post-MDG' development agenda for the 2015 - 2030 period. These 17 goals, and their 168 targets, represent an ambitious integrated set of global priorities for sustainable development. Two SDGs: SDG6 'Ensure access to water and sanitation for all'; and SDG14 'Conserve and sustainably use the oceans, seas and marine resources'; are of particular relevance to UNDP-GEF's work on International Waters. As this volume demonstrates, UNDP-GEF's International Waters portfolio directly supports achievement of the majority of SDG6 and SDG14 targets. For SDG6, these include: reducing pollution to improve water quality; increasing water use efficiency; implementing integrated water resources management; protecting and restoring water-related ecosystems; and expanding international cooperation and capacity building for developing countries. For SDG14, these include: reducing marine pollution; sustaining marine and coastal ecosystems; reducing unsustainable fishing practices; conserving 10 percent or more of coastal areas; and increasing economic benefits to SIDS. Many of the projects also support implementation of SDGs with close linkages to SDG6 and SDG14 such as Food Security (2), Sustainable Consumption/Production (12), Climate Change (13), and Sustainable Cities (11).

International Waters – Delivering Results 2016 clearly demonstrates how a suite 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 also highly replicable and scalable, underscoring the importance of continued GEF and partner investment in sustaining the world's most significant water and ocean systems in support of achieving the Water, Ocean and other SDGs.



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INTRODUCTION



Fisheries for livelihoods © Marine Photobank.

Transboundary 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 percent of global population. Around 55 percent of 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).

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 18 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 formulation 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 35 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 \$641 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 'source-to-sea' 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 fifth (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

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Trebinje Wastewater Utility near Trebinje, Bosnia and Herzegovina. © Max Gudczinski.

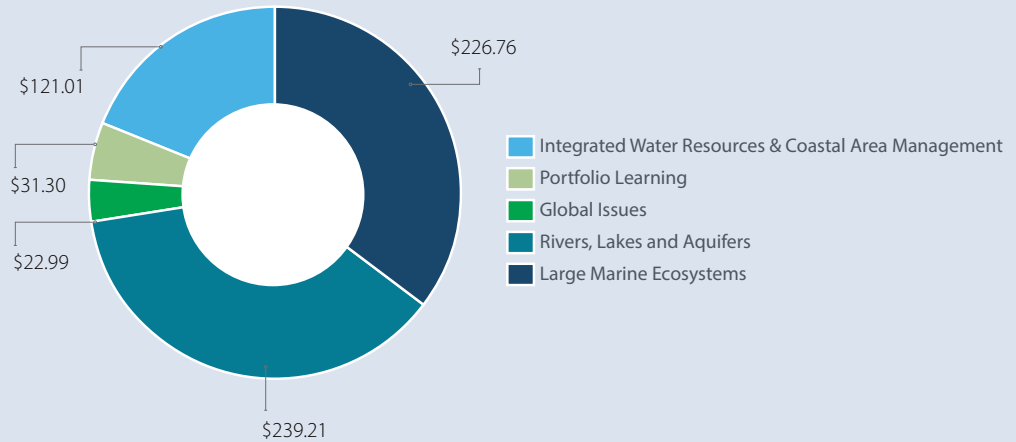
UNDP-GEF INTERNATIONAL WATERS PORTFOLIO – CUMULATIVE RESULTS TRACKER 1991-2015

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
Large Marine Ecosystems							
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	√	√	√	√	√	√	
Transboundary Rivers							
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	√	√	√	√	√	√	√
Drin River basin							
Chu-Talas River basin					√		
Puyango-Tumbes, Catamayo-Chira and Zarumilla Aquifers							
Transboundary Lakes							
Lake Chad	√	√	√	√	√	√	
Lake Prespa	√	√	√	√	√	√	
Lake Baikal	√	√	√				
Lake Tanganyika	√	√	√	√	√	√	√
Lake Peipsi	√	√	√	√	√	√	
Caspian Sea	√	√	√	√	√	√	
Transboundary Aquifers							
Dinaric Karst Aquifer	√	√	√				
Nubian Sandstone Aquifer	√	√	√		√		
Syr Darya basin Aquifers							

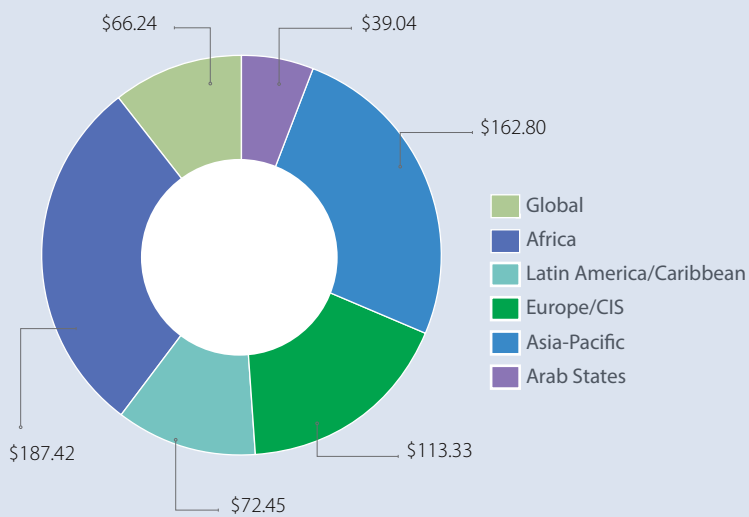
√ = result preceded GEF intervention

UNDP-GEF INTERNATIONAL WATERS PORTFOLIO BY THE NUMBERS

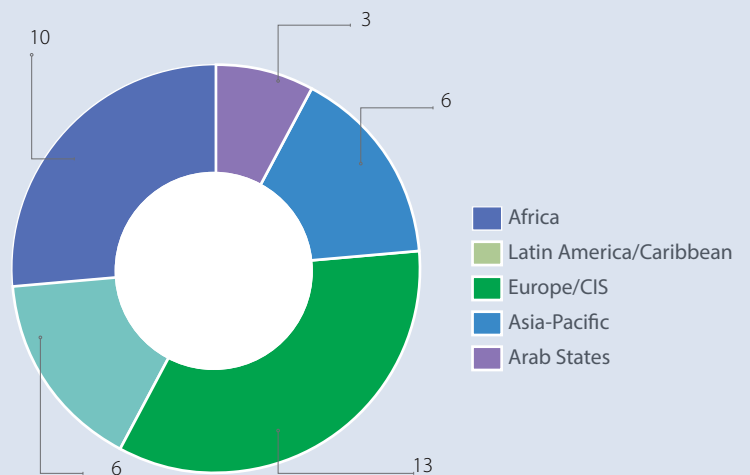
Cumulative GEF Grants by Programme Area (US\$ millions)



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 km² 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 percent 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 percent 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.

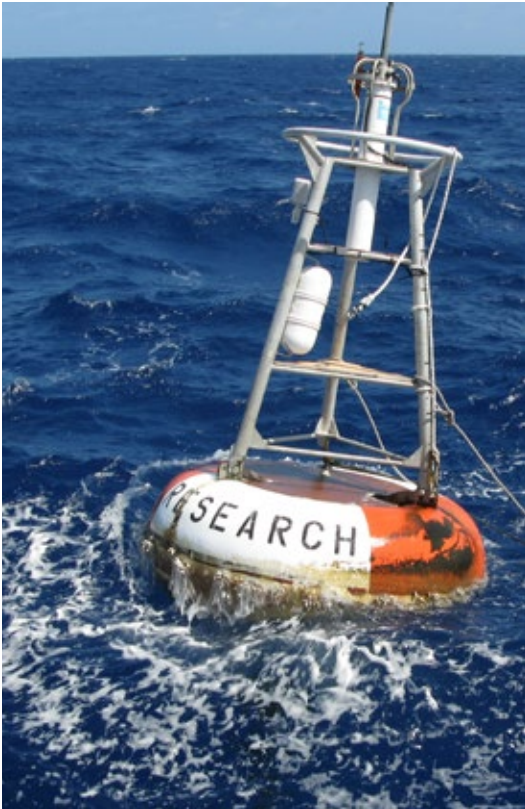
Increasingly, the concept of linking management of larger scale coastal and marine ecosystems such as LMEs to similar efforts in the large river systems that drain to these coastal areas is being applied. Such 'source-to-sea' approaches have been pursued including through linked UNDP-GEF LME and river 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 \$227 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



Agulhas and Somali Currents Large Marine Ecosystems (ASCLME) Project



An oceanographic mooring deployed from the South African research vessel *Algoa*. Fifty individual cruise “legs” were conducted throughout the western Indian Ocean during the five years of the ASCLME Project
© Tommy Bornman.

INFORMATION BOX

Scope: Regional

Countries: Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, South Africa, Tanzania, Somalia

Partners: GEF, UNEP, World Bank, FAO, UNESCO-IOC, EU, France, US NOAA, WWF, IUCN, IOC, WIOMSA, CORDIO

GEF Grants: \$24.20 million
(2 projects)

Co-Finance: \$359.43 million

Project Cost: \$383.63 million

Project website: www.asclme.org

Project Context

The coastline of the ASCLME region is over 15,000 km long from Somalia to South Africa and includes a wide diversity of habitats, including rocky shores, sandy beaches, coral reefs, mangrove systems, seagrass beds and estuaries, all of which supply a wealth of ecosystem services to coastal populations. For instance, the value of fisheries and coastal tourism is estimated to be approximately \$277 billion per year. Furthermore, it has recently been established that countries of the region hold significant reserves of oil, gas and minerals within the ASCLME boundaries.

The countries of the Western Indian Ocean (WIO) region are leading the African continent in their pursuit of Blue Ocean Economy. Governments are accelerating their efforts to increase socioeconomic gains from ocean-based activities and realise inclusive development supported by rapid growth in the ocean-based sectors. The recently endorsed Strategic Action Programme for Sustainable Management of the Western Indian Ocean Large Marine Ecosystems captures a multi-sectoral approach to ocean and coastal governance, and its implementation will help the WIO region to balance economic development with sound environmental management.

Threats and Causes

A set of nine National Marine Ecosystem Diagnostic Analyses (MEDA) and Transboundary Diagnostic Analysis (TDA), developed in 2012, collectively identified the following threats and causes:

- The degradation of water quality within the WIO is caused by a variety of factors including poor catchment management and agricultural practices, inadequate effluent and sewerage management, and marine litter and oil pollution;
- Poorly planned or completely unplanned coastal developments, destructive fishing techniques and the expansion of the extractive industries are contributing to the degradation, disturbance, fragmentation, or complete destruction of habitats;
- Changes in the populations of many species, including sharks and rays, large pelagics, reef and demersal fish, sea cucumbers, prawns and shrimp, lobster, and non-target species such as cetaceans, marine mammals and seabirds, are of concern;
- The WIO region is generally known to be warming faster relative to the global mean, i.e., it is recognised as a global “hotspot” of climate change.

Results Delivered

Process Results

A Strategic Action Programme for Sustainable Management of the Western Indian Oceans Large Marine Ecosystems (WIO LME SAP) was formally endorsed at the ministerial level by all WIO countries¹ in 2014 and 2015. The SAP is a formal agreement by the countries to work together to address transboundary priority issues, threats and impacts through an ecosystem-based approach in order to sustainably manage the Large Marine Ecosystem and to protect the livelihoods and well-being of dependent communities.

The SAP is based on a comprehensive Transboundary Diagnostic Analysis (TDA) of the Large Marine Ecosystems of the WIO, which was developed over a period of four years. The TDA identifies four main areas of concern and impact to the ecosystem goods and services of the western Indian Ocean: 1) water quality degradation; 2) habitat and community modification; 3) declines in living marine resources; and 4) unpredictable environmental variability and extreme events.

GEF is in the process of approving a project to support the implementation of WIO LME SAP through UNDP. This is the “Western Indian Ocean Large Marine Ecosystems Strategic Action Programme Policy Harmonisation and Institutional Reforms”, known as the “SAPPHIRE” project. GEF will further support the WIO countries through UNEP (WIO SAP Implementation Project) and through the World Bank (SWIOFish projects). UNDP-supported and GEF-financed SAPPHIRE project will be closely coordinating and collaborating with investments in the WIO region during the project’s implementation..

Stress Reduction Results

The imperative to reduce environmental stressors is a very prominent part of the plans for SAP Implementation. Two major components of the SAPPHIRE project are: stress reduction through community engagement and empowerment in sustainable resources management; and stress reduction through private sector (industry) commitment to transformations in their operations and management practices. The former component focuses on the need for more effective community engagement in the overall management process, with an emphasis on the involvement of local people, particularly small-scale and artisanal fishers. The latter component aims to develop effective mechanisms for engaging with the maritime sector in the development of joint management approaches. Together, these components

FACT BOX

- » The ASCLME region supports an annual marine fisheries catch of four million tonnes, which constitutes \$943 million in annual fisheries revenues;
- » Tourism is important throughout the region and is clearly linked to healthy marine environments, accounting for approximately 30 to 50 percent of GDP in island states such as Mauritius and Seychelles;
- » Overall species composition is enormously rich, exceeding 11,000 species of plants and animals, 60 to 70 percent of which are found only in the Indo-Pacific ocean region;
- » UNDP-supported and GEF-financed ASCLME project coordinated over 50 research cruises from 2008-2013 in the Western Indian Ocean, with a total value of over \$16 million, for data gathering and on board training of over 70 scientists from the region.

contribute to a carefully crafted strategy to support the countries and the regional bodies to deliver on priority issues for effective ecosystem-based management and governance within the LMEs. It is envisaged that SAP implementation will be carried out through a network of partnerships, and by existing national and regional bodies. In this respect, the region is well positioned to achieve results. A number of strategic partnerships and networks formed over the course of the ASCLME project will remain highly relevant and contribute to the SAP implementation.

Environmental and Socioeconomic Status Results

No environmental and socio-economic status results were envisaged for the implementation of the ASCLME project. However, over its lifespan, the project gathered valuable baseline information on both the environmental status of the ecosystem and the socio-economic status of coastal communities. As a result of an immense effort by the countries and the support of UNDP-GEF and a wide range of other partners, the amount of data and information available to WIO countries has increased significantly. At the same time, the data and information management capacity of the participating states has strengthened considerably, allowing them to monitor long-term changes in the environment and socio-economic conditions.

The implementation of the anticipated SAPPHIRE project is expected to build on work completed by the ASCLME Project and the South West Indian Ocean Fisheries project (SWIOFP) and contribute to improvements in the environmental and socio-economic status of the region.

¹ The Western Indian Ocean region refers to the African coastal states of Somalia, Kenya, Tanzania, Mozambique and South Africa, together with the Indian Ocean island states of Comoros, Madagascar, Mauritius, Reunion (France) and Seychelles.

Sustainable Management of the Benguela Current Large Marine Ecosystem



Alluvial diamonds, washed into the sea by the Orange River, are mined on both sides of the border between Namibia and South Africa. In 2010, South Africa produced 33,000 carats, compared to an annual yield of around two million carats in Namibia © Namdeb.

INFORMATION BOX

Scope: Regional

Countries: Angola, Namibia and South Africa

Partners: GEF, GIZ, FAO, EU, Norway, UNOPS

GEF Grant: \$31.34 million
(3 projects)

Co-Finance: \$262.42 million

Project Cost: \$293.76 million

Project website: <http://www.benguelacc.org>

Project Context

The Benguela Current Large Marine Ecosystem (BCLME) extends from east of the Cape of Good Hope in South Africa, northwards to Cabinda Province in Angola and encompasses the full extent of Namibia's marine environment. It is a major coastal upwelling ecosystem that is richly endowed with both living and non-living resources – from large oil, gas and mineral reserves to abundant fisheries and unrivalled natural beauty.

On 18 March 2013, the governments of Angola, Namibia and South Africa signed the Benguela Current Convention, a ground-breaking environmental treaty that established the Benguela Current Commission (BCC) as a permanent inter-governmental organisation. The BCC provides a vehicle for the countries to implement an integrated, multi-sector, multi-country approach to ocean management.

Threats and Causes

Exploitation of natural resources has had detrimental effects on the ecosystem and the sustainability of the BCLME. For example, increasing fishing pressure – and in some cases, overfishing – has led to the depletion of stocks and, in some instances, stock collapse. Although improvements in research and management have taken place over the past two decades, with some stocks successfully rebuilt, many remain at what is considered to be below sustainable yields.

The extraction of oil, gas and diamonds from the seabed has resulted in the destruction or alteration of the environment in the vicinity of these extractive activities. Inadequate planning has created a number of pollution hotspots, with drainage water, sewage and polluted water entering the marine system. Furthermore, climate change has the potential to severely impact the BCLME through the increased occurrence of extreme weather events such as storm surges, prolonged hot and dry periods interspersed with short, intense rainfall events, sea level rise and changes to river flows.

Results Delivered

Process Results

In March 2013, the governments of Angola, Namibia and South Africa signed the Benguela Current Convention and established the Benguela Current Commission (BCC) – the first multi-lateral commission in the world to be based on the Large Marine Ecosystem approach to ocean governance. In the past year, as a result of unprecedented political support, the BCC has adopted an updated Strategic Action Programme (SAP) that provides the intergovernmental organisation and

its partners with impetus and direction to continue working towards the conservation, protection, rehabilitation, enhancement and sustainable utilisation of the BCLME.

The SAP sets out the policy actions necessary for the three countries to apply blue or ocean economy approaches to derive optimal economic and social benefits from the resources of the BCLME, while mitigating the environmental threats to the health of the ecosystem. It is based on a Transboundary Diagnostic Analysis first developed for the BCLME in 1999 and updated in 2013 and 2014. The original TDA and the revised TDA identify and organise problems and threats into six core themes: 1) living marine resources; 2) non-living marine resources; 3) productivity and environmental variability; 4) pollution; 5) biodiversity and ecosystem health; and 6) human dimensions.

The Governments of Angola, Namibia and South Africa jointly fund the BCC, plus it has attracted substantial additional funding and support for a wide range of activities. At the first BCC Donor Conference hosted by the government of South Africa in 2014, a number of long-term partners of the BCC, including the GEF, UNDP, the Governments of Norway and Germany and the European Union pledged their continued support for the intergovernmental organisation. Specifically, the Government of Germany pledged €8.9 million to support a five-year Marine Spatial Planning project and the GEF, through UNDP, pledged \$10.9 million to realise the inclusive and sustainable development in the BCLME region through improved ocean governance.

Stress Reduction Results

The transboundary nature of certain commercially important fish stocks compounds the challenges of implementing effective fishery management regimes in the BCLME. However, the BCC is tackling this challenge with significant effort. The organisation has convened joint working groups for the transboundary small pelagic and demersal fisheries. The working groups are made up of fisheries' experts from Angola, Namibia and South Africa whose role is to assess the status of the transboundary fisheries and promote collaborative research to ensure fisheries' resources are managed and utilised in an equitable, responsible and sustainable way. The major shared, commercially exploited fish stocks are horse mackerel, shared by Angola and Namibia; and hake, shared by Namibia and South Africa.

Another step towards reducing environmental stressors has been the completion of a comprehensive Spatial Biodiversity Assessment for the BCLME. The outcome of the assessment is a technical report, including a set of detailed maps that help the BCC advise countries on how best to allocate limited biodiversity conservation resources

- » The marine and coastal resources of the BCLME contribute an estimated \$269 billion a year to the economies of the region;
- » The crude oil sector, dominated by Angola, is by far the most significant economic activity, contributing an estimated \$266 billion per year;
- » Namibia and South Africa dominate when it comes to fisheries, which are estimated to generate an economic impact of over \$2.1 billion per year;
- » Marine mining contributes approximately \$800 million, while the recreational fisheries and marine aquaculture sectors generate economic impacts of \$16 million and \$50 million respectively.

and minimise the loss of biodiversity, ecosystem services and other valuable aspects of the natural environment.

Environmental and Socioeconomic Status Results

In general, in the BCLME, the understanding of interaction between humans and the ecological system is weak. This results in limited integration of the human impact into resources management processes. Available data are often fragmented, collected by various agencies and, as a result, analysis for the specific purposes of the BCC is difficult. As a first step towards addressing this shortcoming, the BCC has published a first State of the Marine Environment Report (SOMER). The SOMER includes details on the economic and social contributions of the ecosystem, the current and likely future pressures impacting the BCLME, the state and trends of some key ecosystem health indicators, and past, current and probable future responses to these pressures. Its publication is an exciting first step for the BCC because it provides baseline information about a range of activities and impacts in a standardised manner that may be easily utilised by decision-makers across the three countries.



Fishing boats lie at anchor in Hout Bay, near Cape Town, South Africa. The BCLME supports a wide range of fisheries that are estimated to contribute approximately \$2.1 billion per year in economic benefits © Claire Attwood.

Arafura and Timor Seas Ecosystem Action Programme (ATSEA)



Local fishers in Marlas, Aru Islands, Indonesia
© Jose Padilla.

INFORMATION BOX

Scope: Regional

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

Partners: GEF, UNOPS, Ministry of Marine Affairs and Fisheries, Republic of Indonesia, Ministry of Agriculture and Fisheries, Democratic Republic of Timor-Leste, Department of the Environment (Australia), The World Wide Fund for Nature, Sustainable Forestry Partnership, The Nature Conservancy, Conservation International

GEF Grants: \$2.50 million

Co-Finance: \$6.71 million

Project Cost: \$9.21 million

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

Project Context

Applying the United Nations Convention on the Law of the Sea as a guiding framework, representatives from Indonesia, Timor-Leste, and Australia formed a non-binding agreement in 2002 to foster cooperative management of the Arafura and Timor Seas (ATS). The ATS region is rich in living and non-living marine resources that support livelihoods and food security of millions of people living within the coastal zones in these littoral nations. To find solutions to mounting evidence of unsustainable exploitation of fish stocks and of the vulnerability of fragile ecosystems to a variety of threats, including pollution and climate change, the UNDP-supported and GEF-financed Arafura and Timor Seas Ecosystem Action (ATSEA) Programme (first phase 2010-2014) was set up to ensure integrated, cooperative, sustainable, ecosystem-based management and use of the living coastal and marine resources, including fisheries and biodiversity through the formulation and inter-governmental adoption of a Regional Strategic Action Programme (SAP).

Threats and Causes

The ATSEA TDA identified the following threats: poorly managed extraction of fish, prawns and other biota, coupled with decreased viability of stocks through pollution and disease, resulting in overexploitation; massive declines in ecosystem services of coral reefs, seagrass beds, and mangroves due to modifications to coastal habitats; unsustainable harvesting of key marine species, including migratory, rare, and threatened species of turtles, dugongs, seabirds/shorebirds, sea snakes, cetaceans, sharks, and rays. Scientific forecasts indicate that the coastal/marine environments of the ATS region are vulnerable to the impacts of climate change, due to the typical low profile coasts, shallow continental shelves, and macro-tidal conditions.

Results Delivered

Process Results

The TDA was endorsed by representatives of governmental ministries from Australia, Indonesia, Timor-Leste, and Papua New Guinea. Through extensive consultations with ATS stakeholders, the SAP outlines the priority actions to address ecosystem degradation, while ensuring sustainable development and equitable access to coastal and marine resources for the millions of inhabitants in the region.

The TDA/SAP process culminated with the endorsement of the SAP through the ATSEA Ministerial Declaration, signed in Manado on 14 May 2014, with the clear mandate to achieve the following objectives: (1) provide guidance for regional activities of the coastal states in ATS area; (2) provide opportunities for concrete actions at regional level to work towards the goal; (3) assess the potential for economic and technical

cooperation promoting the long-term sustainability of resources in the ATS; and (4) play an active role in promoting targets related to fisheries and the marine environment directly and/or indirectly.

Through support of the ATSEA Programme, Indonesia and Timor-Leste formulated and approved national action programmes (NAPs) connected to the SAP for the ATS region, and include national level responses to the priority issues identified. In Indonesia, the NAP has facilitated the fisheries management plan for area 718 (ATS), being the first such plan in Indonesia.

The second phase of the ATSEA Programme will be to formalise a regional coordination mechanism. In Bali, the Government of Indonesia has committed to house the regional coordination mechanism, an Oceans and Fisheries Information Center, and host the APEC Fisheries and Food Security Working Group. Other ATSEA SAP initiatives include the Regional Plan of Action of the Coral Triangle Initiative (RPoA-CTI), endorsed by the Head of States of the Coral Triangle countries, including Indonesia, Timor Leste, Malaysia, Papua New Guinea, the Philippines, and Solomon Islands, with a focus on protecting the habitats and reducing the illegal harvesting of rare and threatened migratory species, including marine turtles, dugong, and certain species of whales and dolphins.

Stress Reduction Results

Extensive interaction among regional scientific experts and policy-level stakeholders has led to strengthened regional collaborative capacity for effective transboundary management, promoted in the approved SAP/NAPs, as demonstrated in the effective management of coastal resources in an indigenous community in Northern Australia.

Initial implementation of some SAP and NAP components has formed the foundation for full SAP implementation planned for the second phase of the programme, including: a 15-20 percent reduction in illegal, unreported, and unregulated (IUU) fishing; implementation of the ecosystem approach to fisheries management across the ATS; enhanced management and protection of 20 percent of marine and coastal habitats, including mangroves, coral reefs, and seagrass beds; reduction of total loading of nutrients to coastal waters; reduction in the incidence of marine based pollution; enhanced protection of 10-20 percent of important habitats for threatened and migratory marine species; a 20 percent decrease in direct and indirect harvesting of threatened and migratory species; increased understanding of climate change impacts and incorporation of that knowledge into management plans and strategies; and establishment of management plans for more than 60 percent of at-risk coastal villages. Finally, mechanisms to monitor and evaluate stress reduction measures will be put in place.

- » The coastal area of the ATS contains the highest levels of mangrove diversity in the world, with 45 species recorded covering the area of more than one million hectares;
- » This vast expanse of mangroves contributes to highly productive coastal ecosystems, having >300 g carbon per m² per year and nourishing the most abundant shrimp fisheries in Indonesia;
- » The ATS region is not only rich in natural resources, but also ethnically and linguistically. Among the approximately 4.1 million inhabitants in the four littoral countries, astonishingly there are at least 150 local languages from more than 30 language families spoken by the diverse indigenous and migrant ethnolinguistic communities.

Environmental and Socioeconomic Status Results

Background studies on biophysical and socio-economic conditions of the ATSEA region were undertaken and strengthened through review of available secondary data, information gathered during various workshops and updated primary data collected from two research cruises. The first cruise was conducted in May 2010 in the ATS waters of Indonesia and Timor Leste using the R.V. Baruna Jaya VIII of Indonesia. The second cruise explored the ATS waters of Australia and Timor Leste using the R.V. Solander of Australia in June-July 2011, producing more than 10,000 photographs and 75+ hours of detailed videos from these reefs. This information contributes to the baseline knowledge of the region for measuring the success of implementation of the SAP in the second phase of the ATSEA Programme.



ATSEA Cruise 2 Arafura and Timor Seas © Jose Padilla.

Sustainable Management of Highly Migratory Fish Stocks in the West Pacific and East Asian Seas



Data collection from port sampling at General Santos landing sites, Philippines © Jose Padilla.

INFORMATION BOX

Scope: Regional

Countries: Indonesia, Philippines and Vietnam

Partners: WCPFC

GEF Grant: \$3.23 million
(2 projects)

Co-Finance: \$23.53 million

Project Cost: \$26.76 million

Project website: <http://www.wcpfc.int/west-pacific-east-asia-oceanic-fisheries-management-project>

Project Context

Eastern Indonesia, the Philippines and Vietnam form the western boundary of the Pacific Ocean Warm Pool Large Marine Ecosystem (POWP LME), a globally significant maritime region supporting oceanic fish stocks that migrate throughout this region. These oceanic fish stocks, particularly tuna, provide the resource base for livelihoods, food security and economic development opportunities for the three countries. Tuna harvests of over 2.8 million tons from the POWP LME region account for 60 percent of the global tuna catch in 2014. For the Exclusive Economic Zones (EEZs) of Indonesia, the Philippines and Vietnam that are connected with the POWP LME, the tuna catch is over 15 percent of the global tuna catch.

The Sustainable Management of Highly Migratory Fish Stocks in the West Pacific and East Asian Seas (WPEA-SM) Project follows up on the success of the UNDP-supported and GEF-financed medium size West Pacific East Asia Oceanic Fisheries Management (WPEA OFM) project completed in March 2013. The objective of WPEA-SM project is to improve the management of highly migratory species in the entire Western and Central Pacific Fisheries Commission (WCPFC) Convention Area that overlaps with POWP LME, by continuing to strengthen national capacities and international participation of Indonesia, the Philippines and Vietnam in WCPFC activities. This project is linked with the other UNDP-supported and GEF-financed project covering the 14 Pacific Island Countries. The objective will be achieved through three interlinked components: (i) strengthening regional governance of oceanic fisheries; (ii) national fishery management policy and institutional reform; and (iii) regional knowledge sharing in the WPEA.

Threats and Causes

The sustainable harvest of shared tuna stocks in WPEA faces a number of threats rooted in a greater demand for fish from a rapidly growing population and increasing exports that have substantially increased fishing pressure on the marine fishery resources, both within the sub-region and the wider Western and Central Pacific Ocean (WCPO), which is the WCPFC Convention Area. The major threats are resource depletion and environmental degradation linked to i) incomplete participation in the governance framework for oceanic tuna resources of the WCPFC; ii) inadequate scientific knowledge about oceanic ecosystems and their relationship with fisheries resources; and iii) the advancing climate change-driven shifts in fisheries catch and area.

Results Delivered

Process Results

The WPEA-SM project commenced on 28 October 2014. This project was under the umbrella of Programme Framework Document (PFD) called "Reducing Pollution

and Rebuilding Degraded Marine Resources in the East Asian Seas through Implementation of Intergovernmental Agreements and Catalyzed Investments” that was endorsed by the GEF Secretariat in June 2012. In May 2013, the GEF Council approved the WPEA-SM Project Identification Form and in September 2014, the GEF Council approved the project document.

The Project Appraisal Committee was held in May 2014 and all three project-partner countries (Indonesia, Philippines and Vietnam) accepted WCPFC as the Project Implementing Partner. Project Cooperation Agreement between UNDP and WCPFC was made on 14 October 2014, and the WPEA-SM project officially commenced on 28 October 2014. The Project Inception Workshop was held in Da Nang, Vietnam, 4-5 November 2014.

Stress Reduction Results

Stress in relation to this project is interpreted to be the impact of fisheries on the ecosystem. The lack of sufficient fishery data leads to high uncertainty in stock assessment, increasing the risk of unsustainable management of regional tuna stocks in the WCPO. The WPEA OFM project has greatly enhanced the quality of Indonesian, Philippine and Viet Nam fishery data, which efforts are being continued by WPEA-SM project. Catch data have now been applied to WCPFC’s regional tuna stock assessments. Specifically, the project will continue to result in:

- More accurate estimates of total catch by species
- More accurate estimates of species-specific catches by major fishing gear types
- Size composition data from the three participating countries
- The establishment and expansion of operational-level data collection programmes (logsheets and observer programmes)

- » As responsible managers, the WCPF Commission addresses the broader issues associated with the management of tuna and tuna-like species in the Western and Central Pacific, including the bycatch of other fish species and interactions with birds, mammals and turtles;
- » As the participating countries adopt policies and measures in line with those of the Commission, similar approaches to ecosystem-based management are anticipated throughout the region.

These enhanced national data from the three countries were used in the skipjack, yellowfin and bigeye stock assessments conducted in 2011 and 2014. Clearly, the previous UNDP-GEF WPEA-OFM Project has already done much to mitigate the risks of implied stresses to fish stocks by improving the quality of data applied to regional stock assessments and ecosystem management. The improved accuracy of stock assessments in the entire WCPFC Convention Area has refined the relevant conservation and management measures formulated by the Commission.

Environmental and Socioeconomic Status Results

The project hired more than 80 locals to implement various activities internally and to collect port-sampling data in the provinces of the three participating countries, along with data managers and data entry assistants to manage the data. A large number of workshops and meetings occurred in the three countries, which benefit not only local economy but also enhance social awareness and responsibility to ensure sustainability of local and regional fisheries.



Data collection from port sampling in Bitung, Indonesia © Jose Padilla.

Sulu-Celebes Sea Sustainable Fisheries Management Project (SCS)



Data gathering and monitoring of catch by project enumerators © Marc Wilson.

INFORMATION BOX

Scope: Regional

Countries: Indonesia, Malaysia and the Philippines

Partners: Ministry of Marine Affairs and Fisheries (MoMAF), Indonesia, Department of Fisheries, Sabah, Malaysia, National Fisheries Research and Development Institute (NFRDI), Department of Agriculture, Philippines, Conservation International, Philippines, UNOPS

GEF Grant: \$2.98 million

Co-Finance: \$3.23 million

Project Cost: \$6.12 million

Project website: <http://scfishproject.iwlearn.org/>

Project Context

The Sulu-Celebes Sea (SCS) is an LME bounded by three countries: Indonesia, Malaysia and the Philippines. Being at the heart of the most bio-diverse marine area in the world, it has very rich fishing grounds for large and small pelagics as well as reef fishes. It provides livelihoods and food for the entire region and beyond. These resources, however, have declined due to various threats, including overexploitation, habitat and community modification and global climate change. The goal of the Project was to achieve economically and ecologically sustainable marine fisheries in the SCS for the benefit of communities dependent on these resources, and for the global community who benefit in the conservation of highly diverse marine ecosystems and their ecosystem services. The Project supported integrated, collaborative and participatory management at the local, national and tri-national levels by building on the tri-national agreement among the three countries.

Threats and Causes

The SCS is threatened by expanding coastal populations and increased economic activities, including agriculture, aquaculture, tourism, and mining. Pressures include unsustainable and destructive fishing practices, mismanaged aquaculture, pollution, and poorly planned and inappropriate land use. The Transboundary Diagnostic Analysis (TDA) updated the 2002 Global International Water Assessment (GIWA). The final ranking of priority regional environmental threats was mostly the same, except for climate change moving up to third position, and the addition of invasive species: (i) Unsustainable exploitation of fish, (ii) Habitat loss and community modification, (iii) Climate Change, (iv) Marine pollution, (v) Freshwater shortage, (vi) Alien and invasive species.

Results Delivered

Process Results

The updated TDA and the population genetics study are significant contributions to the scientific knowledge base of the SCS ecosystem. It has been more than 10 years, in 2002, since such a broad assessment was made into the biophysical and socio-economic conditions within the SCS, and the Project was effective in soliciting input from key regional and national scientists. The genetic study of the four selected, regionally important, small pelagic species has demonstrated that these fish stocks are truly shared stocks, and provides sound evidence supporting the tri-national decision to manage the transboundary SCS problems jointly. The regional and national strategic action programmes provide the first set of concrete responses to the transboundary problem of unsustainable exploitation of small pelagic fishes.

The Regional Strategic Action Programme (RSAP) and National SAPs have set out the first set of concrete responses to over-exploitation of small pelagic fisheries. These programmes have provided a solid foundation, and the process of developing the RSAP/NSAPs has equally been important, through strengthening regional collaborative capacities and networks, an important requisite for effective transboundary protection and management of the SCS ecosystem. The demonstration activities also made strong capacity building contributions, through extensive trainings, workshops, and on-the-ground experience for sub-national administrations, local experts, including those from academia.

Stress Reduction Results

Following the concepts of the Ecosystem Approach to Fisheries Management (EAFM), the Project facilitated demonstrations of management approaches in Tarakan (Indonesia) where a year-round, approximately 10,000-ha fisheries restricted area was established; and in Zamboanga (Philippines) where a seasonal, three-month closure of the sardine fishery has been implemented annually since 2011. The Project contributed significantly by financing scientific studies and field surveys validating the viability of the closure, and also by facilitating awareness-raising across a wide spectrum of local and regional stakeholders. The Integrated Fisheries Management Plan for Indonesia was completed in 2014, and approved through Mayor Decree of Tarakan City No. 24 in 2014.

Based upon interviews with local fishers, city officials, and other stakeholders, there is overwhelming support for the fisheries restricted area in Tarakan. The city has extended support to community-based surveillance groups. The Indonesian team designed and rolled out a commendable awareness-raising campaign, using methods and ideas observed at the Philippine demonstration site in Zamboanga.

The demonstration site in Malaysia, known as the Tawau Fishing Zone, occupies an area 64 km long and 49 km wide. In February 2013, the Project facilitated the signing of a Memorandum of Understanding (MoU) between the Department of Fisheries Sabah and a total of 19 local stakeholders to jointly pledge their commitment to sustainable fisheries management of small pelagic fish in the waters of Semporna District. Applying an ecosystem approach to fisheries management (EAFM), the expert team has produced a draft Intergrated Fisheries Management Plan (IFMP) with consultations facilitated by the signatories to the MoU.

The Project supported the development of an Integrated Coastal and Fisheries Resource Management Plan (ICFRMP) for the City of Zamboanga, Philippines. The plan fulfills the requirements of

- » The Sulu Celebes Sea LME is composed of two seas – the Sulu and Celebes Seas that are separated by a chain of islands called the Sulu archipelago;
- » The Sulu Celebes LME has a combined area of over 940,000 km² of which about 124,000 km² are mangrove forests, coral reefs and seagrass beds. Indonesia has the most extensive coral reefs and mangrove ecosystems while Philippines is known to have the largest seagrass cover;
- » Globally, the Sulu-Celebes Sea LME has among the world's most diverse marine biodiversity;
- » Its fisheries have an annual potential yield of over 675,000 metric tons that provide livelihoods and food to more than 40 million people in the coastal areas.

Provincial Board Ordinance No. 329, enacted on 29 May 2008. Through Resolution No. 2014-001, the Technical Executive Committee of the City approved the ICFRMP and endorsed it for submission to the Provincial Board for approval. Approval of this plan is a significant achievement and provides the city with a solid foundation for sustainable management of their coastal and fisheries resources.

The project supported the seasonal closure (since 2011) from 1 December to 1 March of sardine fisheries in the Zamboanga Peninsula, covering an area of 13,987 km². Here sardines make up 90 percent of the average catch. During the fishing ban, most violations were effectively prevented by enforcement bodies. The impact of the fishery closure was clearly visible by 2013, when a 30 percent sardine catch increase (an absolute increase of 20,000 metric tons) was recorded in comparison to 2012. Moreover, spill-over effects to adjacent regions (e.g., Region IX) were visible: Zamboanga City, the “sardine capital” of the Philippines, registered an increase in production in canned sardines. The success of the Zamboanga closed season now serves as a model and inspiration for new seasonal closure areas, e.g., Davao Gulf and Northern Palawan in the Philippines.

Sustainable Management of the Shared Living Marine Resources of the Caribbean Large Marine Ecosystem and Adjacent Regions (CLME Project)



Small-scale fisheries (Caribbean Spiny Lobster)
© ESPESCA.

INFORMATION BOX

Scope: Regional

Countries: Antigua and Barbuda, Bahamas, Barbados, Belize, Brazil, Colombia, Costa Rica, Dominican Republic, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, and United States of America

Partners: UNOPS, UNESCO-IOC, WECAFC-FAO, UNEP-CEP, CRFM, OSPESCA, CERMES

GEF Grant: \$19.51 million
(2 projects)

Co-Finance: \$188.75 million

Project Cost: \$208.26 million

Project website: <http://clmeproject.org/>

Project Context

The marine environment of the Caribbean and the North Brazil Shelf Large Marine Ecosystems (CLME+) provides a multitude of goods and services that are critical for achieving enhanced livelihoods, human well-being and sustained socio-economic development. However the capacity of these ecosystems to continue to provide goods and services to the people of the region has become increasingly impacted by several environmental problems. In order to be successful and sustainable, any attempt at addressing the main threats to the region's marine ecosystems will require the cooperation of all CLME+ countries, people and organizations that have a stake in marine management.

The CLME Project sought to contribute to the "Sustainable management of shared living marine resources of the Caribbean LME and adjacent areas" by building trust among the sectors and nations that share the CLME+, and by fostering the implementation of an ecosystem-based, transboundary management approach.

Threats and Causes

The Transboundary Diagnostic Analyses (TDAs), conducted under the foundational capacity building CLME Project, identified three inter-linked, key environmental problems with severe socio-economic impacts across the CLME+ region and beyond: (i) unsustainable fisheries, resulting in over-exploited and collapsing fish stocks; (ii) habitat degradation and community modification; and (iii) marine pollution. It is recognised that in the absence of mitigation and adaptation measures, the impact of these problems will be further exacerbated as a consequence of climate change and associated sea-level rise, leading to a potentially profound environmental, social and economic crisis in the CLME+ region by mid-century, if not earlier.

Results Delivered

Process Results

In 2013, CLME+ countries approved a 10-year CLME+ Strategic Action Programme (SAP) that provides a roadmap towards sustainable living marine resource management through strengthened and consolidated regional cooperation. Through the SAP, the countries of the region commit to the implementation of a comprehensive package of six coordinated strategies and four sub-strategies, and a total of 77 priority actions, with an initial focus on governance and management of shared Living Marine Resources. By early 2014, the CLME+ SAP had been endorsed by 31 Ministers in 22 CLME+ countries, making it the first time since the establishment of the GEF Trust Fund that an Action Programme developed under the International Waters Focal Area had been so widely endorsed. A commitment from the GEF was

subsequently also obtained in 2014 to financially support the implementation of a project that would assist the CLME+ countries and regional organizations with the implementation of the SAP. A new five-year UNDP-supported and GEF-financed CLME+ Project was initiated in 2015 to catalyse the implementation of the 10-year CLME+ Strategic Action Programme.

Prior to this, and at a more sub-regional level, in 2012 the Caribbean Regional Fisheries Mechanism of the Caribbean Community (CRFM-CARICOM) and the Organisation of the Fisheries and Aquaculture Sector of the Central American Isthmus (OSPESCA), of the Central American Integration System (SICA), already subscribed a Joint Action Plan - one of the CLME Project's early contributions to what would later become priority actions under the CLME+ SAP. The Joint Action Plan was signed by ministers from 19 different countries. The Action Plan promotes the implementation of the ecosystem approach across a series of highly important regional fisheries, such as lobster, queen conch and large pelagics.

Among several other results, the progress towards a Regional Regulation for Spiny Lobster Fisheries for SICA Member States is a key process result obtained with the support from CLME.

Stress Reduction Results

The foundational capacity building project focus was mostly on building trust and (early) enhancement of transboundary governance processes, whereas the annual implementation by OSPESCA (for the 5th time already in 2014) of the Simultaneous Closed Season for spiny lobster fisheries in SICA Member States deserves special mention.

Under the CLME's reef fisheries and biodiversity pilot project, executed by UNEP-CEP in collaboration with local and regional partners, Southwest Cay on the Pedro Banks (Jamaica) was declared

- » An estimated 10 percent of the world's coral reefs and 20 percent of the world's remaining mangrove forests are located within the CLME+ region;
- » With twenty-six independent States and eighteen dependent/associated territories¹ located within the CLME+, the region constitutes one of the geopolitically most complex sets of LMEs in the world, making transboundary ecosystem management particularly challenging.

a Special Fish Conservation Area, and in the Dominican Republic a Strategic Zoning and Fisheries Management Plan was completed for the Montecristi National Park.

In May 2014, the Ministerial Forum of the Caribbean Regional Fisheries Mechanism approved the Sub-Regional Management Plan for the Eastern Caribbean Flyingfish Fishery, the first transboundary fishery management plan to be adopted within the CLME+ Region. Also in May 2014, Caribbean Fisheries Ministers approved an urgent action plan, developed in collaboration with climate change and fisheries agencies within the Caribbean Community, to save Caribbean coral reefs.

Environmental and Socioeconomic Status Results

Positive impacts on environmental and socio-economic status are to be expected from the processes and measures described above in the medium to long term. The new CLME+ Project will assist in the development and implementation of a monitoring and evaluation framework that will facilitate the evaluation of impacts from actions initiated during and supported by the CLME Project.



Unique marine biodiversity © Patrick Debels

¹ This includes overseas dependent territories, outermost regions, associated states, departments and islands with a special status.

Towards Ecosystem Based Management of the Humboldt Current Large Marine Ecosystem



An artisanal fishing boat illegally extracting octopus. The GEF-UNDP Humboldt project is assisting to reduce IUU fishing © Michael J. Akester.

INFORMATION BOX

Scope: Regional with Global implications

Countries: Chile and Peru

Partners: Fisheries Institutes (IFOP and IMARPE); Environment and Fisheries Ministries; Ministries of Foreign Affairs; Private Sector; The Nature Conservancy; WWF; Conservation International; local NGOs; NOAA; Universities; Industrial fishing companies and societies plus artisanal fisherfolk and their associations.

GEF Grants: \$6.93 million

Co-Finance: \$24.62 million

Project Cost: \$31.55 million

Project website: <http://humboldt.iwlearn.org>

Project Context

The Humboldt Current supports one of the world's most productive Large Marine Ecosystems (LMEs), representing approximately 11 percent of the global fish catch, generating goods and services of around \$20 billion annually and hosting globally significant biodiversity. A range of anthropogenic activities are exerting pressure on this unique ecosystem. Ecosystem-based management promoted by the Project seeks to restore and sustain the health, productivity, resilience, and biological diversity of coastal and marine systems and promote the quality of life for humans who depend on them.

Project Objective: Ecosystem-based management in the HCLME is advanced through a coordinated framework that provides for improved governance and the sustainable use of living marine resources and services.

Four specific outcomes to deliver the Project Objective:

1. Planning and policy instruments for Ecosystem-based management (EBM) of the HCLME – the development of the SAP.
2. Institutional capacities strengthened for SAP implementation and for up-scaling the results of pilot interventions at the systems level.
3. Implementation of priority MPA and fisheries management tools to provide knowledge of options for enhanced protection of HCLME and SAP implementation.
4. Implementation of pilot MPAs to underpin ecosystem conservation and resilience.

Threats and Causes

The main threats and causes as identified in the Transboundary Diagnostic Analysis (TDA) are overfishing and habitat destruction due to coastal development and associated pollution. The main barriers to EBM implementation for the HCLME are structural and political. The government institutions responsible for managing coastal and marine systems are fragmented and tend to be organized along political, rather than ecological, boundaries so that the linkages between conservation, economic and sometimes social interests are often overlooked. The causes are multifold and include poor planning and associated population increase in the coastal zone, together with insufficient funding for coordinated scientific research related to the many multisectoral processes involved in the land sea interface.

Results Delivered

Process Results

The project has established multi-sectoral technical working groups operating both nationally and bi-nationally. These groups have been instrumental in the delivery

of Ecosystem Diagnostic Analyses followed by the TDA and causal chain analysis over two years. This was followed by an 18-month SAP development period. Analyses have also been undertaken to determine vulnerable marine ecosystems and risk assessments have been carried out.

Stress Reduction Results

New Marine Protected Areas have been established in Chile (12,000 km²) with associated management plans. In Peru a master plan has been set up for the Guano Islands and Capes National Park via a three-year participatory process. All 118 seamounts in Chile are now protected. In Peru macroalgal beds have been restored under pilot activities with public-private partnerships. Value-adding in Peru has involved the promotion of Direct Human Consumption of anchovy. The lobster fishery in the Robinson Crusoe Islands has received Marine Stewardship Council (MSC) certification – the first artisanal fishery to be certified in the South-East Pacific. Funding for these processes has come from GEF, around \$2 million, and \$8 million from the two countries.

Environmental and Socioeconomic Status Results

Although it is too early to see quantifiable improvements in terms of pollution control and a reversal in the biodiversity reduction

- » The Humboldt Current Large Marine Ecosystem accounts for 11 percent of the global volume of Oxygen Minimum Zone (OMZ) waters, and is the fourth largest area;
- » Coupled with high CO₂ levels from decaying plankton, causing natural acidification, the system is particularly sensitive to additional problems caused by climate change or pollution from the land;
- » Overfishing, pollution and these low oxygen high CO₂ levels have reduced fish landings from around 20 percent of the world's total to 11 percent today.

trend, these aspects will be addressed during the implementation of the Strategic Action Programme (SAP). An increase in 12,000 km² of Marine Protected Areas has been achieved. The Project's promotion of Coastal Marine Spatial Planning with NOAA, and associated training of trainers for local level Ocean Health Index evaluations by Conservation International, will help reduce pressure on the system during the SAP implementation phase.



Pelicans are susceptible to reduced anchovy biomass - their staple diet. GEF-UNDP has helped mitigate the problem © Michael J. Akester, Regional Project Coordinator Chile-Peru, Humboldt Current Large Marine Ecosystem.



Lima 9-13.11.2015 UN compound: binational working group Chile-Peru on top predators (Sharks, Sealions, Killer whales, Tuna, Mahi Mahi among others) in the Humboldt Current Large Marine Ecosystem © Michael J. Akester, Regional Project Coordinator Chile-Peru, Humboldt Current Large Marine Ecosystem.



San Martin, Paracas, Peru: Coastal Marine Spatial Planning designed to allow necessary deep-water port upgrades while protecting wildlife © Michael J. Akester.

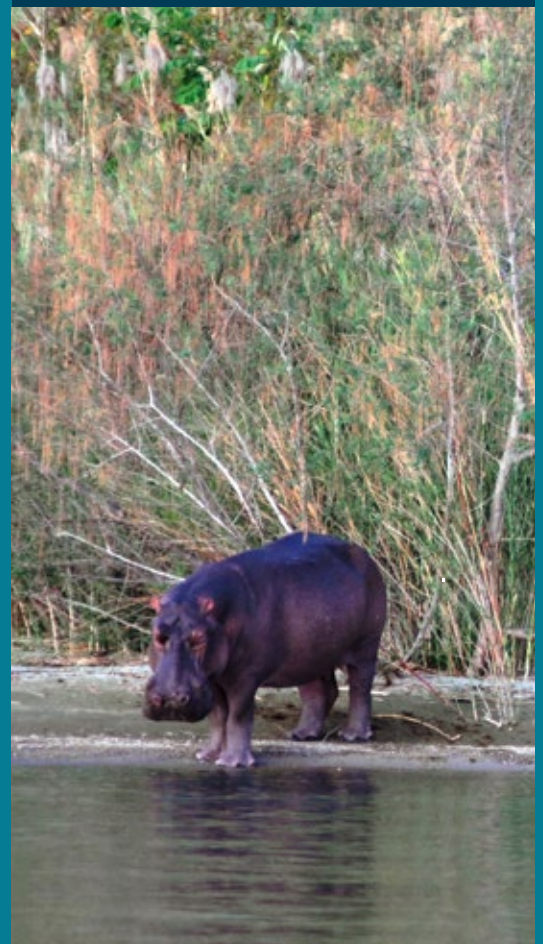
Globally, there are 263 watersheds that cross the political boundaries of two or more countries; these watersheds represent about one half of the earth's land surface and 40 percent of global population. These facts underscore how much water connects us all but also highlight the potential for conflict – 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 22 transboundary river (13), lake (6) and aquifer (3) projects and has cumulatively programmed \$239 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 nine of these transboundary waters programmes.

Transboundary Rivers, Lakes and Aquifers



Partnership Interventions for the Implementation of the Strategic Action Programme for Lake Tanganyika



Young boy selling boiled eggs on the shores of Lake Tanganyika, Burundi (DRC coastline in the background)
© Saskia Marijnissen.

INFORMATION BOX

Scope: Regional

Countries: Republic of Burundi, Democratic Republic of Congo (DRC), United Republic of Tanzania, and Republic of Zambia

Partners: African Development Bank, Nordic Development Fund, ICRAF, WWF, UNOPS, IUCN and Governments of Burundi, DR Congo, Tanzania and Zambia

GEF Grant: \$24.20 million
(2 projects)

Co-Finance: \$47.89 million

Project Cost: \$62.09 million

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

Project Context

Lake Tanganyika, situated in the Albertine Rift Valley, is shared by Burundi, the Democratic Republic of Congo (DRC), Tanzania, and Zambia. The Lake Tanganyika basin is recognised globally for its unique richness of aquatic and terrestrial biodiversity, exceptional scenic beauty, and high ecological and socio-economic value. The lake harbors over 1,500 species, more than half of which occur nowhere else in the world. It supports one of the largest fisheries on the African continent. The annual fish production potential is estimated to vary in the range of 165,000 - 200,000 tonnes. The natural resources of the Lake and its catchment area support the livelihoods of the 13 million people in the basin. UNDP, with GEF finance, has been supporting the four governments to strengthen their capacity to jointly manage and sustain the resources of Lake Tanganyika and its basin through a series of phased interventions since early 1990s.

Threats and Causes

As identified by the original Transboundary Diagnostic Analysis (TDA), the major threats to the integrity of the Lake Tanganyika basin ecosystem are: 1) depleting fisheries, 2) increasing pollution, 3) excessive sedimentation, 4) degradation of habitats and 5) biological invasions. The implications of these threats are the global loss of biodiversity, loss of shared fisheries resources, decreased productivity of land, and decline of water quality. The magnitude of these threats is expected to be intensified by the impacts of climate change and the rapidly growing basin population (2-3.2 percent annually, among the highest on the planet).

Immediate causes are unsustainable fisheries, deforestation, unsustainable agricultural practices, prospecting and mining activities in the Lake, and polluted water entering the lake. The main root causes of these threats include lack of resources such as skills, infrastructure and funds, policies not harmonized across the riparian states, poor enforcement of existing regulations in the riparian countries, few appropriate regulations for the management of the Lake, extreme poverty and limited livelihood options for the basin population.

Results Delivered

Process Results

The first phase (1995-2000) of the UNDP-supported and GEF-financed programme to Lake Tanganyika assisted its riparian countries to develop a Transboundary Diagnostic Analysis (TDA), and a Strategic Action Programme (SAP) that was endorsed by the countries in 2000. During the preparatory phase of the next phase (2003-2007), UNDP assisted the countries to finalise drafting of the Convention on the Sustainable

Management of Lake Tanganyika. Upon its ratification and coming into force in 2007, the Lake Tanganyika Authority (LTA) was formally established and became operational in 2008 as an inter-governmental body responsible for the coordination of actions for the sustainable management and development of the Lake Tanganyika basin.

During the second phase of GEF support through UNDP (2008-2013), the institutional capacity of the LTA was strengthened with the establishment of the Permanent Secretariat in Bujumbura, Burundi, the multi-sectoral Management Committee, comprising senior policy makers from ministries responsible for finance, fisheries, environment and water from all four countries, and the Conference of Ministers. To start implementing the Lake Tanganyika Convention, a draft protocol titled Protocol for the Sustainable Management of the Lake Tanganyika Basin was developed. The LTA was supported by a number of partners such as UNDP, AfDB, FAO, and IUCN in this process.

The LTA led the process to develop four National Action Plans, one for each riparian country, and a revision of the SAP to incorporate emerging priorities, such as climate change and biological invasion. The revised SAP was endorsed by the LTA Conference of Ministers in 2012. NAPs were validated in all countries to lead the integration of transboundary priorities into the respective national policy and institutional framework. As the first step to implement priority actions at the national level, Burundi developed a policy to set the water quality standards and enhanced the capacity of the water quality monitoring laboratory.

The project also supported the development of the Regional Integrated Environmental Monitoring Programme (RIEMP) to strengthen the environmental monitoring capacity of the LTA in close partnership with the relevant local and national institutions in the basin states, and with support from UNEP and the Government of China. The RIEMP is to collect and share information on a range of parameters, including water quality, fisheries, biodiversity, biological invasions, land use, and meteorological data.

Stress Reduction Results

Activities to reduce sediment loads and to reduce water pollution yielded some results. The project promoted improved catchment management activities, sustainable agricultural practices, tree planting, energy efficient stoves, and alternative income generating activities in pilot communities in DRC, Tanzania and Zambia to reduce pressure from human activities on the catchment and the lake shore habitats, with particular focus on the sedimentation load reduction. As result there has been demonstrated reduction in sedimentation from the monitoring sites. Through the promotion of energy efficient stoves to reduce wood consumption, it is reported that the Bangwe Prison in Kigoma (Tanzania) reduced its wood fuel consumption from 15m³ to about 5m³ per month. Water pollution reduction was realized

- » Lake Tanganyika is the world's longest (673 km) freshwater lake; the world's second largest by volume (18,900 km³); and the world's second deepest (1,470 metres). It contains almost 17 percent of the world's available surface freshwater;
- » Due to its high altitude, great depth, slow rate of refill and mountainous location, it has rarely had an outflow to the sea and is considered to be 'practically endorheic'. Its estimated residence¹ time goes back 5,500 years, making the Lake highly vulnerable to pollution;
- » The basin contains forest reserves (Kigwena) and national parks including Gombe Stream, Katavi, Mahale, and Nsumbu. These are few remaining habitats for chimpanzees, rare blue duiker and swamp dwelling sitatunga.

through the pilot investment in Burundi to enhance the wastewater collection and treatment capacity in Bujumbura. Through this targeted investment, volume of treated wastewater increased from 6000m³ to 11,000m³ resulting in improved water quality of the wastewater effluent entering into the Lake.

Environmental and Socioeconomic Status Results

A total of about two million trees were planted in the four countries to improve land cover, reduce erosion, and strengthen the land's capacity as carbon sink. In DR Congo, 27 tree seedling nurseries were established. In Tanzania, 120,000 different trees and fruit seedlings were planted in secondary schools and primary schools. In Zambia tree nurseries were established in 10 schools. Tree Selection Manual was developed with the help of the World Agro-Forestry Centre (ICRAF) for future interventions in the Lake Tanganyika Catchment. A site visit one year after the project closure in Uvira, Democratic Republic of the Congo (DRC), shows strong recovery of forest land supported by the project.

Alternative income generating activities (AIG), promoted in selected basin communities to reduce population pressure on the basin ecosystem, have resulted in not only stress reduction to the ecosystem but also improved socioeconomic status of the basin population. In Zambia, 847 people benefited from the revolving fund established by the project to support AIG. Beneficiaries monitored reported that their income increased from an average of \$157 to \$5,000 per year. The revolving fund has been fully absorbed by a national institution for sustainability. In Uvira, the project trained basin population to manufacture energy saving stoves made of 100 percent local materials. A local association later adopted manufacturing of energy saving stoves as a business venture with sales of \$10,000 before the project completion.

Support to the Cubango-Okavango River Basin Strategic Action Programme Implementation



Mokoro (a local name for the wooden canoes), the best means to navigate through shallow channels in the Okavango Delta for transport and for bird-watching ecotourism © Akiko Yamamoto.

INFORMATION BOX

Scope: Regional

Countries: Angola, Botswana and Namibia

Partners: OKACOM, Sweden/Sida, USAID, DFID, GIZ, World Bank, FAO

GEF Grant: \$12.47 million
(2 projects)

Co-Finance: \$340.91 million

Project Cost: \$353.38 million

Project website: <http://epsmo.iwlearn.org/>;
<http://www.okacom.org/>

Project Context

The 1994 OKACOM Agreement commits the three member states (Angola, Botswana, and Namibia) to promoting a coordinated and environmentally sustainable water resource development, while addressing the legitimate social and economic needs of each of the riparian states. The agreement established the Permanent Okavango River Basin Water Commission (OKACOM) mandated to advise the member states on sustainable long-term yield, reasonable demand, conservation criteria, development of water resources and prevention of pollution towards best management of the basin. The role of the OKACOM is to anticipate and reduce the unintended, unacceptable and often unnecessary impacts that occur as a result of uncoordinated resource development. This UNDP-supported and GEF-financed programme has been supporting the OKACOM and its member states since the early 1990s to strengthen their joint management capacity of the resources of the Cubango-Okavango River Basin (CORB).

Threats and Causes

Transboundary Diagnostic Analysis (TDA) was completed in 2011 and publically launched in 2012. It identified four emerging priority areas of concern, namely: 1) Variation and reduction of hydrological flow; 2) Changes in sediment dynamics; 3) Changes in water quality; 4) Changes in the abundance and distribution of biota. These areas of concern are driven by four underlying pressures: 1) Population dynamics; 2) Land use change; 3) Poverty; and 4) Climate Change. The member states have been engaged on these priority areas collectively and internationally and have started to put in place mechanisms and policies to manage potential impacts.

Results Delivered

Process Results

Over the 20 years of its existence, the OKACOM is experiencing institutional growth. In May 2015, the member states amended the 2007 Organizational Structure Agreement to include the Ministers' Forum as the highest decision making body of the Commission. To further advance its mandate, the Commission has developed a joint shared vision for the basin in a consultative manner. To this effect, the member states and stakeholders agreed that OKACOM would provide scientifically based technical support to its member states that leads to an: "economically prosperous, socially just and environmentally healthy development of the Cubango-Okavango River Basin [CORB]." (OKACOM Vision)

The last decade witnessed a steady increase in the countries' commitment to basin-level coordination, through extensive efforts to develop a basin-wide baseline to

finalize the TDA towards an agreement on the basin-wide priorities presented in SAP. All countries endorsed the SAP with respective government approvals. The member states have increased their regular contribution to support the OKACOM operational costs from zero in 2009 to \$100,000/year/country in 2013. Support from SIDA accelerated the member states' effort to strengthen the institutional capacity of OKACOM.

In 2011, the countries finalised the Strategic Action Programme (SAP). This is a basin-wide policy framework document for the CORB that lays down the principles for the development of the basin and improvements of the livelihoods of its people through the cooperative management of the basin and its shared natural resources. The SAP is supported by the National Action Plans (NAPs) for the three base states. The SAP presents priority actions in four thematic areas: 1) Livelihoods and Socio-Economic Development; 2) Water Resource Management; 3) Land Management and 4) Environment and Biodiversity. All SAP thematic areas respond to the four main underlying causes or drivers identified in the TDA and SAP.

As part of SAP implementation, OKACOM is developing a CORB Water Allocation Strategy for the basin to: 1) define key principles that can facilitate effective regulation and control the use of water resources within the CORB; 2) set up criteria that can assist the formulations of appropriate mechanisms to equitably allocate water for ecological, social and economic needs in line with the OKACOM mandate and objectives; 3) set up the framework that encourages efficient and effective social, economic and environmental use of water resources within the basin; and 4) set procedures that facilitate the production of accurate data on water availability, use and demand for both surface and ground water across different spatial and time scales.

To effectively implement the SAP, OKACOM is keen to expand its coordination mandates beyond the water sector and is developing strategies in the areas of: transboundary fisheries management; land use planning; and transboundary environmental assessment guidelines based on the prior notification principle. With USAID support, the member states have developed and approved Africa's first Transboundary Fisheries Management Plan that is being jointly implemented. The plan aims to promote and carry out joint patrols, joint surveys and monitoring as well as sharing of data and information.

To accelerate the implementation of the SAP, as soon as it was endorsed, OKACOM requested partners and institutions that undertake initiatives in the CORB to align their activities closely with the SAP framework so that all ongoing and upcoming initiatives in the CORB contribute to SAP implementation. SAP implementation

- » CORB TDA and SAP are both highly innovative because of the current relatively pristine state of the CORB ecosystem;
- » CORB TDA adopted scenario analyses to analyse potential transboundary impacts of future development activities, instead of summarising the transboundary damages of past development activities;
- » CORB SAP embraces the concept of Development Space and is a strategic policy document that promotes socially and environmentally sustainable development in the basin.

is coordinated and monitored through a five-year implementation plan. In addition to the high level of commitment by member states, support from partners, such as USAID, SIDA, UNDP, has been integral in making progress in SAP implementation.

Stress Reduction Results

With increasing demand for socio-economic development in the basin, OKACOM is proactively investing in interventions that will limit the stress. SAP (and NAP) implementation promotes the precautionary approach with regard to sustainable and environmentally conscious development activities to minimize the stress on the basin ecosystem from development activities.

To reduce stress associated with agrochemicals, local farmers are piloting conservation agriculture approaches, with USAID support. For example, appropriate techniques for harvesting devil's claw



Moremi Wildlife Reserve in the Okavango Delta © Akiko Yamamoto.

(high value commodity) were introduced to promote alternative income generating activities. As a result of this USAID supported initiative, over six million hectares of biologically important land in the basin is under improved management regimes.

The upcoming Cubango-Okavango River Basin Strategic Action Programme Implementation project will support OKACOM's capacity to assess potential stresses from future activities using the Integrated Flow Assessment. This will help prevent unintended stresses to the ecosystem.

Environmental and Socioeconomic Status Results

The CORB ecosystem is still relatively pristine. The socioeconomic status of the basin population is lower than their respective national average in all member states. The member states must allow resources of the basin to be utilized to support the socioeconomic development of the basin population. OKACOM's role is to guide the future development activities in the basin in an environmentally and socially responsible manner. To this end, OKACOM embraced a concept of Development Space and, with UNDP support, aims to establish a joint agreement on the long-term acceptable Development Space (i.e., how much water resources development should be allowed in the basin to support socioeconomic development), based on the IWRM principles and the trade-off analysis between conventional water resource development and maximizing ecosystem services.

Identification and implementation of alternative development and management options are key objectives of the basin states through OKACOM as articulated in the agreed joint shared vision for the CORB as well as in SAP. If OKACOM can provide technically sound and timely advice to its member states from the transboundary perspective, then national and sectoral planning, and its implementation, can incorporate more transboundary considerations, without too many compromises on their national agendas.

At a macro level, with the World Bank support, the Commission is undertaking the Multi-sectoral Investment Opportunity Analysis (MSIOA) in the CORB to guide the most appropriate direction of development investments. MSIOA will identify available development options, evaluate them from economic, environmental and social perspectives, and help inform the best return in the use of one cubic metre of water either in agriculture, mining, energy or in the tourism sector in an evidence-based model. The "best return" is determined after taking into consideration potential economic, social and environmental impacts.

At a micro level, OKACOM already realised some environmental and socio-economic improvements with USAID support: over 12,000 basin residents with improved access to clean drinking water; over 6,000 basin residents with new or improved sanitation facilities; over 2,000 people engaged in new or enhanced conservation-based income-generating activities; over 1,300 people harvesting natural products in Angola and Namibia; and a ten-fold increase in average crop yields for farmers practicing conservation agriculture. Furthermore, OKACOM interventions, supported by USAID, trained nearly 4,500 basin residents in over 40 communities in natural resource management, and assisted over 30,000 people to be more resilient to the effects of climate change.

The Cubango-Okavango River Basin SAP project will further assist OKACOM to realise environmental and socio-economic benefits through SAP implementation. To support the basin communities and their local environment, the project will pilot several low-impact development activities, in areas of tourism, wildlife conflict mitigation and fisheries, with minimum negative impacts on the basin ecosystem. A special emphasis is put on evaluating the economic performance of the piloted activities as an alternative to traditional development activities. The project also helps strengthen the joint management and cooperative decision making capacity of the Cubango-Okavango River basin states, through the development of the BDMF and its accompanying Decision Support System. Plus it will strengthen OKACOM's capacity on water resource management through enhancing its monitoring and data collection systems and by addressing a number of knowledge gaps in water resource planning.



Briefing session with the former Governor of Cuando-Cubango Province during the EPSMO project © OKACOM.



Meandering Okavango River Panhandle, Botswana © OKACOM.



Trained guides at a lodge in the Moremi Wildlife Reserve, ready to take tourists for game drive. The government of Botswana promotes high-end ecotourism in the Okavango Delta for its low-impact on the environment, which provides alternative income generating activities to local communities in and around the Okavango Delta © Akiko Yamamoto.

Strategic Action Programme for the Orange-Sengu River Basin



Quiver Tree, Orange-Sengu River Basin © Leonie Marinovich, ORASECOM.

INFORMATION BOX

Scope: Regional

Countries: Botswana, Lesotho, Namibia, South Africa

Partners: Orange Senqu River Commission, Southern African Development Community, GIZ, DFID, USAID, EU, French GEF, IUCN, GWP

GEF Grant: \$18.00 million
(2 projects)

Co-Finance: \$153.00 million

Project Cost: \$171.00 million

Project website: <http://www.orasecom.org>
<http://wis.orasecom.org>

Project Context

The Orange-Senqu River basin, shared by Botswana, Lesotho, Namibia and South Africa, is the most developed transboundary river basin in southern Africa. It has the largest international water transfer scheme (the Lesotho Highlands Water Project) in the world, and other inter-basin transfers. With a basin population of 14 million and directly supporting 19 million, including South Africa's highly industrialised Gauteng province, the use of the basin water resources is of critical importance to the region's economy. Furthermore, the basin has extraordinary landscapes of high ecological value, ranging from the Maloti-Drakensberg Mountains to the Namib Desert.

Orange-Senqu River Commission (ORASECOM) was established in 2000 by the four riparian states. Through a series of interventions since 2004, the UNDP, with GEF finance, supports the four governments and ORASECOM to mainstream environmental and sustainability considerations into their joint planning and management of the shared water resources.

Threats and Causes

The Orange-Senqu River basin Transboundary Diagnostic Analysis (TDA) identifies four major, mostly transboundary, threats to the basin's ecosystems: 1) increasing water demand; 2) declining water resources quality, including in some areas pollution from acid mine drainage from derelict mines; 3) changes to the hydrological regime; and 4) land degradation. The dual effect of human influences, and often-fragile ecosystems, has resulted in a deterioration of the basin's ecosystems. The functioning of wetlands, riverine habitats, the estuary and groundwater are impaired. This has socio-economic consequences related to the loss of goods, services and opportunities that these ecosystems would otherwise provide.

Results Delivered

Process Results

Following the development of a preliminary TDA, the first phase of the UNDP-GEF project assisted the basin countries in the development of a TDA, a Strategic Action Programme (SAP), and corresponding Action Plans for each of the basin countries. The SAP was endorsed by the ORASECOM Forum of Parties (i.e., Ministerial Conference) by all basin states in August 2014, and forms the environmental component of the broader Orange-Senqu Integrated Water Resource Management (IWRM) Plan.

The SAP was developed through intensive stakeholder consultation facilitated by inter-sectoral SAP and Action Plan Working Groups and broader National Stakeholder Platform in each country. The National Stakeholder Platforms comprised stakeholders representing

a wide range of relevant role-players, including both state and non-state participants.

The project supported the establishment of the Orange-Senqu Water Information System (WIS), an important repository for basin related technical and environmental information crucial for environmental monitoring and informed decision-making for joint basin management. Draft transboundary Environmental Impact Assessment (EIA) guidelines were also developed.

Notably, the project created links between ORASECOM and the Benguela Current Commission (BCC) realizing the Source-to-Sea approach at the Orange-Senqu River basin and the Benguela Current Large Marine Ecosystem, a first of its kind in Africa, focusing on the ecological interactions between the freshwater ecosystems of the Orange-Senqu and the marine ecosystems associated with the Benguela current. A study on the Orange River mouth was conducted focusing on this ecological interactions. Its findings were published by ORASECOM and informed the Orange River Mouth Management Plan. Two commissions are committed to continued collaboration for the Source-to-Sea approach.

Responding to key TDA findings and SAP priorities, the planned second phase of UNDP-GEF support to ORASECOM will upgrade the WIS and support the consultation process for the formal adoption of the transboundary EIA guidelines by all countries, the development of a basin-wide environmental flow regime and management systems, and an integrated, basin-wide water resources quality monitoring system.

Stress Reduction Results

Through demonstration projects, the first phase addressed priority areas of concern identified in the preliminary TDA. In the arid part of the basin in Botswana, the project piloted measures to reduce basin communities' dependency on groundwater resources, such as rainwater harvesting, and to improve rangeland management practices to strengthen communities' resilience. The project also worked closely with the private agriculture sector (grape production), in both Namibia and South Africa, on improving water efficiency through water demand management. The successful implementation of these water efficient irrigation schemes on a pilot scale has led to prioritising similar irrigation schemes in the South Africa Action Plan.

In response to SAP and Action Plan priority areas, key interventions of the second phase of the UNDP-GEF project include the control of alien invasive species (focusing on *Prosopis*) in the lower reaches of the basin and the rehabilitation of the significantly degraded Orange-Senqu river estuary. In the upper and middle reaches of the river, the reduction of point-source pollution in Lesotho and in Botswana will be addressed, complementing the development of the basin-wide water resources quality-monitoring regime.

- » South Africa's Gauteng province, the largest economic hub in the basin, generates roughly 60 percent of the country's GDP, or US\$210 billion;
- » The Orange-Senqu River basin hosts five RAMSAR sites, with the river mouth being the first transboundary RAMSAR site in southern Africa;
- » After the 2011 floods, the extensive invasion of alien mesquite *Prosopis* species along the Orange River and its estuary is reducing habitat area and quality.

Environmental and Socioeconomic Status Results

Lesotho generates 40 percent of the total run-off from only three percent of the basin area. The country suffers serious erosion in the mountainous upstream areas and in the degraded rangelands. Reversing land degradation was identified as priority. The first phase of UNDP-GEF support piloted community-led rangeland management practices and promoted alternative income generating activities in selected communities to reduce pressure on the land. This was highly successful both in terms of reducing environmental stress and in terms of improving socioeconomic status of community members participated in the pilot. A participant from Ha Sekhonyana Community said, "Initially, looking at the extent of soil erosion ... I didn't think that those dongas could actually be stopped from deepening, but upon joining the project and with the training we were getting ... we did believe ... that we could realize the dream of stopping the soil erosion." The Government of Lesotho prioritised the widespread upscaling of similar activities in the Lesotho Action Plan.



Stone lines constructed at a monitoring point at Ha Sekhonyana and regeneration of grass on the trapped soil at the same spot (five months after stone lines building and 12 months later) © ORASECOM

Formulation of an Action Programme for the Integrated Management of the Shared Nubian Aquifer



Oasis, Libyan Desert © WikimAGES.

INFORMATION BOX

Scope: Regional

Countries: Egypt, Chad, Libya, Sudan

Partners: IAEA, UNESCO, Joint NSAS Authority

GEF Grants: \$0.99 million

Co-Finance: \$1.43 million

Project Cost: \$2.41 million

Project website: <http://iwlearn.net/iw-projects/2020>

Project Context

The Nubian Sandstone Aquifer System (NSAS) is one of the largest aquifers in the world covering approximately two million square kilometres across Chad, Egypt, Libya, and Sudan. Increasing pressure on these shared groundwater resources, despite unclear knowledge of the transboundary impacts, represents a potential threat to a precious resource that if unchecked could lead to deterioration of water quality and/or irrational water use with the potential to harm biodiversity, cause land degradation or trigger transboundary conflict.

The project objective was to establish a rational and equitable management of the NSAS for sustainable socio-economic development and protection of biodiversity and land resources. The immediate objectives were as follows: prepare and agree on a Shared Aquifer Diagnostic Analysis (SADA) to identify, understand and reach agreement on priority issues, threats and root causes of the NSAS; address and fill key methodological, data and capacity gaps needed for strategic planning decisions, using appropriate technical approaches with a focus on isotope techniques and applications under the supervision of the International Atomic Energy Agency (IAEA); undertake preparation of a Strategic Action Programme (SAP) to outline the necessary legal, policy and institutional reforms needed to address the priority threats and their root causes as identified in the SADA for the NSAS with a focus on the environmental aspects of aquifer management; and establish a framework for developing an agreed legal and institutional mechanism towards a NSAS convention for joint management and rational use of the shared NSAS.

Threats and Causes

The Nubian Aquifer faces a number of threats including:

- Declining water levels - withdrawal from aquifers poses the threat of loss of access to the water resource through wells and oases drying up; so far however there is little indication that the lateral extent of drawdown can extend far enough to cause transboundary effects;
- Damage to or loss of aquifer dependent ecosystems and biodiversity - due to declining water levels, water quality impairments, increased population density, and expansion of agriculture;
- Water quality deterioration - increased use of NSAS can degrade surface and near—surface waters and may induce saline intrusion from coastal or deeper aquifers;
- Climate change - higher temperatures and arid conditions affect water resources in the region;

- Changes in groundwater regime - groundwater abstraction causes steep hydraulic gradients toward production wells, eventually developing into widespread cones of depression.

Root causes behind these threats include population growth, intensified agriculture, weak management, anthropogenic climate change, insufficient knowledge and data, inadequate regulatory environment, and wide institutional and individual capacity differences across the countries.

Results Delivered

Process Results

The project supported preparation of stakeholder analysis, causal chain analysis, and governance analysis reports in all four countries. The project developed a scientifically robust Shared Diagnostic Analysis, the SADA. As part of the SADA, the project developed a hydrological model for the Nubian aquifer that has the capability to predict decreases in aquifer level due to abstraction. The model was designed to meet the needs of the SADA component of this project by anticipating the transboundary effects of abstraction under a variety of future development scenarios. One of the most important conclusions from this assessment was that the immediate, direct transboundary threat of water-level declines due to cross border extraction is lower than originally thought. The SADA findings served as an excellent platform for the next step in this foundational project, development of the SAP.

The SAP was prepared by a team of experts from the four countries involved, as well as the GEF, UNDP, UNESCO, and the IAEA and sets out a strategy for protecting the water resources and ecosystems of the NSAS. It identifies over 100 management actions and targets to strengthen the regional and national capacities to achieve the objectives and the vision for the NSAS. An extensive Monitoring and Evaluation framework for SAP implementation was also developed. Specific Process, Stress Reduction and Environmental Status Indicators were prepared with an outline of next steps. It is anticipated that the majority of these management actions will take place under the co-ordination of the Joint Authority with expected full co-operation between national institutes and the responsible government authorities. In 2013 in Vienna, the Nubian SAP was agreed and signed by senior representatives from all four countries, as well as the Chair of the Joint Authority.

General targets in the SAP include: strengthening existing cooperation (Joint Authority); enhancing cooperation framework on data exchange; effective establishment and performance of national offices and Joint Authority; implementation of legal and institutional requirements to enforce regional protection and control of the NSAS; and control of waste disposal practices. Climate change specific targets include legal and institutional mechanisms to enable adaptation to climate change

- » The one million year old Nubian Sandstone Aquifer System (NSAS) is the world's largest known fossil water aquifer system;
- » According to the recent Krypton-81 study it is not rechargeable;
- » The aquifer contains an estimated 375,000 km³ of groundwater, with perhaps only 15,000 km³ recoverable;
- » The aquifer is facing heavy demands from agriculture and drinking water with extraction likely to double in the next 50-100 years;
- » Climate change is expected to increase temperatures, inland evaporation and salinization, and change precipitation patterns.

and cooperation on collecting data related to climate change. Legal and institutional targets include establishing legal and institutional procedures to develop transboundary cooperation and integration of the NSAS dependent socio-economic activities. Agriculture targets include: preserving and protecting the water resources of the NSAS from the negative effects of agriculture; preserving agroecosystems and associated biodiversity; creating regional and legal institutional mechanism to protect NSAS dependent ecosystems and biodiversity; extending the competence of the Joint Authority in this field; and establishing and maintaining a regional database for ecosystem and biodiversity in view of proper management and conservation.

Stress Reduction Results

The present project was a TDA/SAP foundational project. Stress reduction results will be achieved through the new GEF SAP Implementation project, developed by the countries with support from UNDP and IAEA, endorsed by all the countries and submitted to GEF in June 2015 for funding consideration.

Environmental and Socioeconomic Status Results

The SADA, and associated regional groundwater hydrological model, established a solid baseline of environmental and socioeconomic data on the Nubian including estimates of storage, abstraction rates and locations, precipitation rates, population distribution, and primary and secondary stakeholders. The objective was to produce a regional model of the aquifer to predict the decrease in aquifer level due to abstraction. The groundwater resource data and information baseline, in combination with the model, can be used to inform and monitor SAP implementation, particularly decisions on abstraction rates and locations.

Protection and Sustainable Use of the Dinaric Karst Transboundary Aquifer System (DIKTAS)



DIKTAS stakeholder meeting © DIKTAS.

INFORMATION BOX

Scope: Regional

Countries: Albania, Bosnia & Herzegovina, Croatia and Montenegro

Partners: GWP-MED, IGRAC, IAH, Competence Pool Water Austria, Karst Centre Postojna Slovenia, National Research Council Italy, International Research Centre on Karst, Guilin China, Edwards Aquifer Authority USA, University of Malaga Spain, UNESCO Chair – INWEB Thessaloniki

GEF Grant: \$2.16 million

Co-Finance: \$3.65 million

Project Cost: \$5.81 million

Project website: <http://diktas.iwlearn.org/>

Project Context

The DIKTAS Project is a collaborative effort to facilitate the equitable, sustainable management of the Dinaric Karst Aquifer System's transboundary water resources, and protect the unique dependent ecosystems. Karst is a special type of geologic environment, formed by dissolution and corrosion of soluble rocks, characterized by almost total absence of surface water and rapid groundwater flows under the surface. The Dinaric Karst Aquifer System is located in South-Eastern Europe and shared by several countries. DIKTAS is the first major project introducing the integrated management principles in a transboundary karst freshwater aquifer system of such magnitude. At the global level, the project aims to focus the attention of the international community on the abundant but vulnerable water resources contained in karst aquifers.

Threats and Causes

The inappropriate disposal of solid waste and wastewater was recognized as the most important threat to groundwater. Agricultural and industrial activities also contribute to groundwater pollution. Infrastructure for hydropower production, a significant part of energy production in all DIKTAS countries, also has some negative impacts. The lack of financial means, the poorly regulated market economy, and weak environmental values have an overall negative impact on the management of the karst water resources in the region. Due to lack of monitoring at local and regional levels there is limited knowledge on the current state and future trends regarding the quality and quantity of groundwater.

Results Delivered

Process Results

Scientific knowledge of the Dinaric Karst Aquifer System has been substantially enhanced. A large amount of data and information was collected, structured and harmonized, providing new insights in hydrogeological, socio-economical, ecological and institutional aspects of the shared groundwaters. An in-depth analysis of eight selected Transboundary Aquifers identified the main transboundary issues of concern, along with their causes. The DIKTAS Transboundary Diagnostic Analysis (TDA) can now be used by countries to make informed management decisions about karst groundwaters. National Inter-Ministerial Committees (NICs) were established in all project countries, involving representatives from all water-related sectors. The NICs were very active, substantially contributing to major project outputs, primarily the Transboundary Diagnostic Analysis and the Strategic Action Programme.

Numerous capacity building and awareness raising activities were carried out to increase knowledge of karst aquifers and increase the sense of ownership of decision makers and stakeholders in aquifer sharing countries. The DIKTAS Conference 'Karst without Boundaries' brought together 155 international karst scientists, engineers and DIKTAS stakeholders from 35 countries and was a huge success.

The Strategic Action Programme (SAP) containing joint priority actions is prepared by the project team and broadly discussed with National Inter-Ministerial Committees. The SAP is seen as a starting point for further international cooperation; its final content will be decided by aquifer states in late 2015.

Environmental and Socioeconomic Status Results

Dependency on groundwater in the project area is very high, especially for drinking water supply (up to 90 percent in some project countries) and energy production. Nevertheless, the knowledge on state and change of the Dinaric karst aquifer system is very low due to lack of data/monitoring. Monitoring network is practically non-existing outside of water supply zones. There are no guidelines on monitoring in complex karst environment. Design of regional

- » It is estimated that karst aquifers supply drinking water to 25 percent of the global population;
- » The term karst originates from this region as well as karstology as a scientific discipline;
- » Some parts of the region receive more than 5000mm of precipitation per year but during dry periods experience shortage of water;
- » Some karst springs in the region have maximal discharge more than 100 m³/sec;
- » Groundwater table can fluctuate more than 300 m during the year at the same location.

quantity and quality monitoring network – suggested in the SAP – is the necessary step for informed groundwater management in the region. Harmonisation of the criteria for the sanitary protection zones is the other major action planned which is a precondition to common management of shared resources. These are the main priority actions defined in SAP.



A Dinaric Karst spring of the Buna River in Bosnia and Herzegovina © Nevin Kresic.

Reducing Transboundary Degradation in the Kura Aras River Basin



Kura River © Mary Matthews.

INFORMATION BOX

Scope: Regional

Countries: Armenia, Azerbaijan and Georgia

Partners: UNOPS, EU, USAID, NUFFIC, UNECE, OSCE, Finland, UNDP Shared Waters Partnership, national governments

GEF Grant: \$3.62 million

Co-Finance: \$40.70 million

Project Cost: \$44.32 million

Project website: <http://www.kura-aras.org>

Project Context

The foundational phase of the UNDP-supported and GEF-financed Kura Aras Project was conducted from 2011-2014 and included Armenia, Azerbaijan and Georgia in the South Caucasus. The conditions of the Kura and Aras Rivers have been degraded by human activities over time, including the development during the Soviet era. This has resulted in pollution, irrational water use, degradation of the ecosystems, and severe flooding events. Since then each of the South Caucasus countries have worked to address water management independently. The objective of this proposed project was to take steps to ensure that the quality and quantity of the water throughout the Kura-Aras river system met the requirements for optimum ecosystem and human communities to function through coordinated actions. After the three countries worked together to identify priority problems (TDA) and develop recommendations (SAP) to address these, Armenia elected to work independently on these issues. With the technical and facilitation support of the project, Azerbaijan and Georgia fostered strong commitment towards cooperation through ministerial endorsement of the Kura River Strategic Action Programme (SAP).

Threats and Causes

The threats to the Kura Aras River Basin identified in the TDA are: reduction of hydrological flow; deterioration of water quality; degradation of ecosystems; and flooding and climate change impacts. Climate change is also a cross cutting issue. The root causes are: lack of economic value of services from water resources and ecosystems in economic development planning; lack of information regarding costs of ecosystem degradation and water-borne pollution to the national economies; lack of integrated, accessible data and analysis for decision makers; and continued reliance on outdated water management practices. The Kura River SAP is designed to support Azerbaijan and Georgia in addressing these issues.

Results Delivered

Process Results

The foundational phase of the Kura Aras Project has achieved key process results of an agreed updated TDA and a bi-national ministerially endorsed SAP in line with GEF IW best practice. In addition, national IWRM plans were developed for Azerbaijan and Georgia, and a common agreed IWRM MSc Curriculum was developed for Baku State University, Tbilisi State University, and Yerevan State University of Architecture and Construction. The Project Team conceptualised, developed and implemented the UNDP-GEF EU Kura Aras IWRM Academy to build awareness of IWRM issues for rising decision makers across sectors in all three countries. Together, these results

paved the way for SAP implementation and the strengthening of institutions to ensure sustainable results for the Kura Basin.

The representatives of the participating governments - Armenia, Azerbaijan and Georgia - approved the updated TDA in 2013. The TDA contains national and regional level empirical information addressing the priority transboundary threats and recommendations based on the Causal Chain Analyses. Desk studies were conducted on water quality, hydrology, climate change impacts, sectoral development trends, and gender mainstreaming in the basin. These serve as critical baselines for developments in the basin and monitoring improvements through stress reduction measures, and environmental and socioeconomic status measures in the future.

Azerbaijan and Georgia are in the process of finalising the bilateral agreement under negotiation on 'Cooperation in the Field of Protection and Sustainable Use of the Water Resources of the Kura River Basin' in line with the UNECE 1992 Helsinki Convention on the Protection and Use of Transboundary Watercourses and International Lakes. While Armenia elected to work independently on transboundary issues, Azerbaijan and Georgia requested UNDP-GEF support to develop a Strategic Action Programme to address degradation of the Kura River Basin. The SAP is strongly linked to the bilateral UNECE agreement to help countries meet their regional and international commitments. Both Azerbaijan and Georgia Ministers of Ecology/Environment endorsed the Kura River SAP in May 2014.

The SAP is based on national level IWRM plans developed through a highly interactive, participatory multisectoral approach in Azerbaijan and Georgia. In Azerbaijan, the Ministry of Ecology is preparing to submit the national IWRM plan to the Cabinet of Ministers for approval as of August 2015. In Georgia, the IWRM plan links closely to the EU Association Agreement and serves as a guidance document for achieving the commitments under this agreement. In both cases, the SAP implementation will support the implementation of these national IWRM plans.

During the foundational phase of the Kura Aras Project, the Project Steering Committee approved the development of a common, shared IWRM curriculum for major national universities. The project conducted a needs assessment for IWRM trained professionals in the countries and, based on this, national and international IWRM experts worked closely with these universities to develop a common curriculum to be taught to students in-country and in their national languages. The project helped the universities obtain a grant from the Dutch government to support training of lecturers for six weeks by Delft University and UNESCO IHE. The IWRM MSc in Azerbaijan has been approved at the highest level of

FACT BOX

- » The ancient Silk Route followed the Kura River;
- » Some of the earliest identified hominids thrived in the Kura Basin;
- » The Alazani Ghanik sub-basin of the Kura River is a hub of wine making and has over 512 unique varieties of grapes some dating back over 4000 years;
- » Endemic species of grains in the basin are being used to strengthen the genetic diversity of the world's grain supply;
- » Groundwater from the Kura Basin supplies municipal drinking water to Baku through interbasin transfers.

government and students are being recruited for classes starting autumn 2016. In Georgia, the final approval process is soon to be completed, along with courses starting concurrently in Azerbaijan.

The Kura Aras Project realised the importance of training of decision makers across sectors on the basic approaches to IWRM. With co-financing from the EU, the EU Kura Aras IWRM Academy was developed and has trained 62 rising decision makers across three countries in national languages on the principals of IWRM. With 72 hours of class time, this training served as a model for trainings and capacity building for emerging local IWRM experts working in sectors including environment, energy, agriculture, municipal water management, emergency management, public health and academia. This model will be replicated and expanded in the implementation of the Kura River SAP for Azerbaijan and Georgia, due to begin in 2016. Empowering the local and national populations to implement their own IWRM capacity building efforts ensures sustainability of GEF investments.

Stress Reduction Results

Demonstration projects on calculating environmental flows, using rapid ecological assessment and biomonitoring, were conducted in each country. Environmental flows are defined as managing the flows in the river to reflect the natural annual and seasonal flow regime in which the ecosystem evolved. Rivers, highly altered by reservoirs, irrigation, and diversions, create stresses on the ecosystem. Developing environmental flow calculations allows the river ecosystem to function more sustainably; these calculations initially rely on a combination of historical hydrological and meteorological information. To best understand the optimal flow regime for sustainable environmental management, it is also important to determine how changes in the flow impact the ecology, through assessments of flora and fauna. The approach used during the demonstration project included using biomonitoring

of macroinvertebrates as a key indicator of ecosystem health impacted by both water quality and quantity.

This demonstration project gave the agencies in charge of water management hands on experience with ecosystem based approaches to understand the impacts of how improving flow regime can support ecosystem functions. This is intended to help them adopt improved flow regimes to support the river environment. The expected stress reduction of this effort is to show the linkages between water flow and ecological health and to enable the countries to take steps to implement environmental flows. The demonstration project developed guidance for a staged approach to environmental flow calculations. This staged approach allows countries take steps to adjust flows based on currently available hydrological and meteorological information in the near future, and then to refine the calculation approach as more information on the river ecosystem is collected in the future based on international best practices. The implementation of this staged environmental flow regime will reduce stresses on the river ecosystem and improve the sustainable integrated use of the water in the river basin.

Environmental and Socioeconomic Status Results

The TDA established critical environmental, social and economic baseline information on the Kura river ecosystem. Information on the historical and current water use and flow regime will support monitoring of impacts of climate change on available water resources. The information collected on water quality status in each country provides an important review of the challenges for

water management and pollution abatement needed in the region based on both common and nationally distinct water quality parameters. Information on ecosystem status, based on available historical information and currently available information identifies the impacts of human development and gaps in information needed to best monitor changes to the river ecosystems. Baseline information on flooding events and climate change will enable the countries to gauge impacts of changes over time. In addition to the information collected on the priority transboundary environmental issues, socio-economic information was collected, including key baseline demographic information, and sectoral economic development information for the basin. In addition to the information collected for the TDA in line with best practices, the project also conducted a trend analysis of the planned developments across key water using sectors, including agriculture, energy industry, municipal water development and environment to determine the anticipated impacts of planned development on available water resources. A gender mainstreaming study was also conducted to serve as a critical baseline for how water management approaches are currently implemented in each of the countries. Within the demonstration project on environmental flows using rapid ecological assessment and biomonitoring, initial data on river ecosystem functions in response to flow alteration were collected and will serve as key baseline data for future efforts to gauge the health of the ecosystem. The information collected during this phase of the project serves as the baseline for long-term monitoring of the impacts of the stress reduction of the demonstration project on environmental flows, and implementation of the SAP.



IWRM Academy Lecture © Mary Matthews.



Regional experts using biomonitoring with identification of macro-invertebrates for water quality monitoring to improve IWRM approaches in the Kura River Basin © Mary Matthews.

Integrated Natural Resource Management in the Baikal Basin Transboundary Ecosystem



The project team on a boat river Pereemnaya, Baikal Natural Reserve © Vladimir Mamaev.

Project Context

Lake Baikal and its transboundary basin, including Lake Khovsgol, are globally significant in terms of international waters and biodiversity values.

Lake Baikal, situated in south-east Siberia, is one of the world's most unique lakes. It is a global hotspot of aquatic biodiversity, including hundreds of endemic species of amphipods, flatworms, and fish, as well as the only species of freshwater seal on earth. Over 2,550 species are found in the Lake Baikal region, including 1,550 species of fauna and 1,000 plant species with numbers increasing as new species are discovered.

Similar to Lake Tanganyika in East Africa, Lake Baikal lies in a geological rift zone that continues to extend as a result of the divergence of continental plates. With an estimated age of between 25-30 million years, and a maximum depth of 1,637 metres, Lake Baikal is the world's oldest and the deepest lake. Significantly, the lake contains approximately 20 percent of the globally available surface freshwater. Lake Baikal is also famous for its water clarity, up to a depth of 40 metres. In 1996, Lake Baikal was added to the UNESCO list of World Heritage Sites (UNESCO 1996), representing outstanding examples of ongoing ecological and biological processes in evolution and development of freshwater ecosystems, and as a significant habitat for the conservation of biodiversity. Furthermore, the Baikal region includes numerous historical, archaeological, cultural and sacred monuments. In 2008, the Russian Government declared Lake Baikal to be one of the Seven Wonders of Russia.

A total of 336 rivers flow into Lake Baikal, yet it has only one outlet, the Angara River. As a result, the residence time of water in the lake is over 300 years. The largest tributary of Lake Baikal is the Selenga River that starts in Mongolia and contributes on average 50 percent of the annual inflow to the lake. In 1996, the delta of the Selenga River was included on the list of Ramsar Wetlands of International Importance because of its significant role as a habitat for flora and fauna, as well as its role in functioning as a water filter against pollution flowing into the lake.

The water catchment of Lake Baikal is shared by the Russian Federation (Russia) and Mongolia. The Baikal Basin includes Lake Khovsgol, Mongolia's largest lake that contains almost 75 percent of the country's surface freshwater. The basin also includes numerous mountains, extensive boreal forests, tundra, and steppes that have significant scenic and natural values. Due to climatic and geologic differences in the region, a great variety of plants and animal species are found.

INFORMATION BOX

Scope: Regional

Countries: Russia and Mongolia

Partners: Ministry of Natural Resources and Ecology (Russian Federation); Ministry of Environment, Green Development and Tourism (Mongolia); United Nations Office of Project Services (UNOPS); Coca-Cola; UNESCO; Foundation for the Protection of Lake Baikal; Russian and Mongolian national and regional governments.

GEF Grant: \$3.90 million

Co-Finance: \$49.29 million

Project Cost: \$53.19 million

Project website: <http://baikal.iwlearn.org/>

The project goal is to spearhead integrated natural resource management of the Lake Baikal Basin, including Khovsgol Lake, ensuring ecosystem resilience, and reduced water quality threats in the context of sustainable economic development.

The Lake Baikal Project is financed by the GEF and co-financed by the Russian and Mongolian governments. The project is implemented by UNDP and executed by UNOPS.

Threats and Causes

The major transboundary threats identified in the Transboundary Diagnostic Analysis (TDA) for the Baikal Basin are: degradation of aquatic and terrestrial habitats in the form of deforestation, degradation of agricultural, pasture and range lands; hydrological regime changes causing changes to water levels in the catchment basin; decline of water quality through thermal and chemical contamination, increased suspended solids and sedimentation, microbial pathogenic contamination, organic pollution and eutrophication; unsustainable fisheries and wildlife exploitation; biological invasions; and the impacts of climate change and natural disasters. The root causes of the failure of transboundary governance can be found at the legal, institutional, socio-economic and policy levels. Due to weak national legal and regulatory frameworks, a lack of stakeholder (including private sector) involvement, and minimal awareness of the value of natural resources, there is no transboundary apex body to provide a framework for cooperation, oversight and coordination of intersectoral governance. As a result, regional intergovernmental agreements are inadequate, legislation is fragmented and, coupled with limited financial mechanisms and resources, there is insufficient monitoring of environmental and socio-economic processes.

Results Delivered

Process Results

The 2013 Transboundary Diagnostic Analysis of the Lake Baikal basin ecosystem became a basis for the development of the draft Strategic Action Program (SAP) in 2014 that includes joint Russian-Mongolian actions for addressing the major transboundary problems of the Lake Baikal basin ecosystem. The SAP, that has now been submitted to both governments for approval, defines strategic goals and objectives of the programme, as well as determines six basic components: protection, restoration and sustainable management of main water and terrestrial habitats; pollution reduction and water quality improvement; rational use of fish, hunting and other wild nature resources; control and prevention of biological invasions; adaptation to climate change consequences; natural disaster readiness. In total, 16 strategic objectives were defined, and key indicators set.

- » Lake Baikal is the largest (by volume) freshwater lake in the world;
- » Lake Baikal contains one fifth of the world's accessible fresh pure water;
- » Khovsgol Lake contains 75 percent of Mongolian fresh water;
- » Lake Baikal is UNESCO World Heritage Site;
- » The largest tributary of Lake Baikal is the Selenga River that starts in Mongolia and contributes on average 50 percent of Lake Baikal's annual inflow.

The project also developed and implemented two sub-basin management plans for Russia (Tugnuy-Sukhara and Khilok), and two sub-basin management plans for Mongolia (Ider and Eg).

The legal and institutional framework of bilateral transboundary water cooperation was analysed and enhanced. A draft revised bilateral agreement on transboundary water cooperation, including a new institutional structure, has been developed and presented to both governments. The Joint Russian-Mongolian Commission on Environmental Protection and Cooperation in Environment Conservation had regular meetings in 2013, 2014 and 2015.

Stress Reduction Results

Four pilot projects in the Dzhidinsky mining plant; the Kholodninsky poly-metal deposit; the Holbinsky gold mine; and the Nikolsky coal mine have been implemented.

In the Nikolsky coal mine, test results show the level of anthropogenic impact on the ecological conditions of the researched area is within satisfactory limits. Estimation of water biodiversity condition in the region as a result of developed measures of safe storage, recycling, neutralization and utilization of toxic substances, contained in wastes of Dzhidinsky mining plant was carried out.

Analysis of environmental conditions in the Kholodninsky region showed the necessity of developing and introducing engineering methods of water ecosystem protection for minimizing negative impacts arising from polluted water from exploratory activities. This water has high levels of mineralization and heavy metals (zinc, manganese, cadmium, strontium, iron). Recommendations for removing heavy metals included their transformation from sulphate and hydrocarbonate-sulphate type to near natural hydrocarbonate-calcium type were worked out.

For the Holbinsky gold mine, recommendations to control threats to ecosystems and biodiversity from gold mining pollutants in wastewater were drawn up. Each pilot project had a significant impact on reducing pollution to waterways and the environment.

Additionally, in 2014 at the Dzhidinzky mining plant, the Russian government conducted ecosystem restoration activities. Both the Holbinsky gold mining site and the Dzhidinzky mining plant showed a 50 percent reduction in water pollution due to mainstreaming interventions according to a scientific study carried out by Ministry of Natural Resources and Ecology of the Russian Federation within Russia's federal programme for the sustainable management and socio-economic development of the Lake Baikal region.

Eight eco-tourism plans were developed and implemented in the Russian part of the Baikal Basin in Baikal State Nature Biosphere Reserve, Zabaikalsky National Park, Island Tonkii, Khoboi Cape and the reservation zone for Khankhoiskaya Bank; and the Zapovednoe Pribaikalye protected area. The project also built an eco-trail, Cedar Alley, in the Baikal State Nature Biosphere Reserve.

Environmental and Socioeconomic Status Results

A harmonized coordinated water-quality monitoring programme for the Baikal Basin was developed. Jointly monitored by the two countries, the analyses included 13 parameters: temperature,

specific conductance, pH value, suspended solids, dissolved oxygen, sulphates, calcium, sodium and potassium ion sum, nitrite nitrogen and phosphates expressed as phosphorus, magnesium, hardness, nitrate nitrogen and BOD. Monitoring of 30 pollutants has been harmonized: ammonium nitrogen, nitrites, total iron, chlorides, nitrates, COD, petrochemicals, anionic synthetic surface active agents, and heavy metals. Additionally, models for the transport of pollutants, and water balance, in the Baikal Basin were developed.

Baikal Basin-Wide Pollution Hot Spot Analysis and Reporting Methodology has been endorsed by joint working group of the institute of Plenipotentiaries.

The Baikal Information Center (BIC) was established and a web portal launched. A Biannual State of the Environment Report for the Baikal Basin was prepared. The comprehensive Ecological Atlas of the Baikal Basin, with some 150 maps, was published in English, Mongolian and Russian. The documentary 'Baikal without boundaries' was made and broadcasted on Russian and Mongolian TV channels.

In sum, a more than 50 percent improvement in the knowledge of key technical aspects of ecosystem-based IWRM management has been reached. In total more than 350 people were trained in both countries.



Shore of Lake Baikal in Buryatia near Istomino village © Vladimir Mamaev.



Lake Baikal shore of the biggest island on the lake – Olhon island © Vladimir Mamaev.



The project team inspecting the platform build with project funds in the protected area on Olhon Island in Lake Baikal, Russia © Vladimir Mamaev.

Reducing Conflicting Water Uses in the Artibonite River Basin through Development and Adoption of a Multi-Focal Area Strategic Action Programme



Lake Péligre (French: Lac de Péligre) is the second largest lake in Haiti. It was created as a result of the construction of the Péligre Hydroelectric Dam on the Artibonite River in 1956-1957 © lunionsuite.

INFORMATION BOX

Scope: Regional

Countries: Dominican Republic and Haiti

Partners: Oxfam-Québec, CIDA, Helvetas, Dominican Secretariat of Environment and Natural Resources (SEMARENA), Haitian Ministry of Environment (MDE), FAO

GEF Grants: \$3.78 million

Co-Finance: \$7.18 million

Project Cost: \$10.96 million

Project website: <http://www.artibonite.org/>

Project Context

On the island of Hispaniola, the bi-national Artibonite watershed provides vital ecosystem services on which the poorest communities of the Dominican Republic and Haiti depend. The upper Artibonite encompasses the headwaters in the Dominican Republic and western Haiti, and is a combination of two major sub-watersheds, the Macasias and the Artibonite proper in addition to numerous micro-watersheds between the Dominican border and the Peligre Dam in Haiti. Variation in rainfall patterns, extreme altitude gradient, and rugged topography give rise to a complicated mosaic of 16 distinct micro-bioclimatic regions, ranging from “thorn woodlands” in the lower Artibonite, to “Montane wet forest” at the highest point near Nalga de Maco.

This UNDP supported GEF funded project is addressing these critical issues—through the International Waters and Land Degradation focal areas—by working to establish a bi-national framework for integrated management of the Artibonite watershed that will promote comprehensive, ecosystem-based reforms, demonstrations and invest

Threats and Causes

An assortment of pernicious threats—including deforestation, inappropriate land-use, and harmful agricultural practices—have resulted in severe land degradation and reduced water quality and availability, curtailing the long-term viability of the watershed. Should this situation continue or worsen, conflicts over water resources and social instability could plague the entire island.

Finalised in 2015 by a bi-national technical team, the Transboundary Diagnostic Analysis (TDA) identifies the root causes as governance, capacity, and financial gaps. For example, the absence of environmental protection measures in communities and improper land use and inappropriate farming practices are causing pollution of waterways that is altering the water quality. At the same time, unsustainable farming practices on marginal land, poor environmental awareness, population pressures and lack of a political agenda for the recovery of degraded land are affecting both water and soil quality. The TDA prioritises actions in control of sedimentation, governance, and capacity to make decisions based on international principles for binational water management.

Results Delivered

Process Results

With support from this project, the Dominican Republic and Haiti finalised and approved the Transboundary Diagnostic Analysis (TDA) of the Artibonite watershed

that identifies the priority transboundary concerns, and their immediate and root causes. The Strategic Action Programme (SAP) of agreed policy, regulatory and institutional reforms, and investments, needed to move basin management towards sustainability, has also been completed, though not yet endorsed by the two governments. The SAP has been further operationalized through preparation of separate National Action Plans (NAPs). Watershed management councils in the Dominican Republic and Haiti have been formed, and are now actively following through on the NAPs and SAP. The National Integrated Watershed Action Plan (NIWAP), which mainstreams actions in both sustainable land management (SLM) and integrated water resources management (IWRM), has been completed in the Dominican Republic and now serves as the guiding plan for the Watershed Management Council of that country. In Haiti the NIWAP was developed, and is pending approval. The project created a tool to identify areas of land degradation and its drivers, specifically catered toward the expertise and budgets of the Dominican Republic and Haiti. It was developed through cooperation and technology sharing between these two governments.

In terms of building capacity for long-term resource mobilisation in support of NIWAP and SAP outcomes, investment plans for infrastructure and irrigation, energy, reforestation, and agro-livestock management were included in the NIWAP of each country and in the SAP. The funding gap for the first ten years has been estimated at \$88 million; \$50 million has already been secured from the World Bank and the Inter-American Development Bank (IADB), each contributing \$25 million.

Stress Reduction Results

In terms of ecosystem protection, the combined area of land under legal protection is now 119,475 ha. There has been a validated net gain in forest cover of 15,000 ha across the catchment, converted from agriculture, with a resulting estimated annual reduction of sedimentation of 857,670 tons. The project has also supported the establishment of mechanisms to produce monitoring reports on stress reduction measures.

Environmental and Socioeconomic Status Results

Draft environmental status indicators have been developed for the watershed and are in the process of validation. For many of these indicators, baselines have already been measured or estimated. A monitoring plan for indicator tracking is part of the SAP.

Through pilot work, the project engaged rural households in environmentally sound and sustainable economic activities. The pilot project in Haiti, for example, developed niche markets for the upper Artibonite, which led to the formulation of: (1) market research; (2) analysis of competitiveness and standards; (3) a

- » The Artibonite is Hispaniola's largest watershed, spanning 955,000 ha, of which 71 percent is located in Haiti and 29 percent in Dominican Republic;
- » Poverty is particularly pronounced in the Artibonite watershed, with the conditions in the frontier zone of the upper basin remaining among the more difficult in Haiti. Likewise, the level of poverty in the Dominican Artibonite is extremely high;
- » Over 3.5 million people rely on the Peligre Dam, Haiti's only major reservoir, for domestic water and irrigation, sourced solely from the Artibonite River and provides up to 50 percent of Haiti's energy needs;
- » Downstream, the Artibonite valley is Haiti's main production centre for rice and staples, with more than 34,500 ha of irrigated land.

value chain study; (4) an action plan to increase competitiveness of micro-enterprises; and (5) business plans and financial profitability analyses. Through this work, a total of 1,070 producers have directed benefited in the pilot area, Saint Michel d'Attalaye, and an additional 750 families benefited from the repair of roads.



*Artibonite River at the border between Dominican Republic and Haiti
© María Eugenia Morales, Programme Officer, Environment and Renewable Energy Unit, UNDP, Dominican Republic.*

Reducing and Preventing Land-based Pollution in the Rio de la Plata/Maritime Front through Implementation of the FrePlata Strategic Action Programme



Satellite photo aerial view of the Rio de la Plata and its Maritime Front (RPMF), a large river-marine system fed by the waters of the Rio de la Plata basin © Wikimages.

INFORMATION BOX

Scope: Regional

Countries: Uruguay and Argentina

Partners: MVOTMA, SAyDS, CTMFM, CARP

GEF Grant: \$8.53 million
(2 projects)

Co-Finance: \$19.35 million

Project Cost: \$27.88 million

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

Project Context

The Rio de la Plata and its Maritime Front (RPMF) is a large river-marine system that is fed by the waters of the Rio de la Plata basin. It is a transitional water system hosting significant biodiversity and of high biological productivity, shared by two countries, 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 percent in Argentina; 70 percent in Uruguay). Economic activities developed along the coastal area include agriculture, fisheries, industrial and port activities, and these activities generate most of the industrial GDP: 65 percent in Argentina; and 87 percent in Uruguay. The Rio de la Plata and its Maritime Front has become a sink for substantial urban, agricultural and industrial pollution, and suffers from habitat degradation due to dredging, sedimentation and the alteration of hydrological processes. The project's main objective has been to advance sustainable management of the Rio de la Plata and its Maritime Front (RPMF) by reducing and preventing land-based pollution as agreed in the Strategic Action Programme.

Threats and Causes

The RPMF is a transboundary aquatic system whose pollution and biodiversity loss are shared by two countries. Despite its sizeable flow (24,000 m³/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 and erosion. During the last decade, the economies of both countries have exhibited strong growth of 7-9 percent 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 project has contributed to strengthening the institutional basis and cooperation frameworks for SAP implementation at the following levels: bi-national commissions; national agencies with mandates over land-based activities; and local governments. The project has supported establishment of the water quality monitoring programmes at national levels, including formalising government inter-ministerial agreements to apply these programmes. At the regional level, binational technical advisory groups have been consolidated that includes progress in formalising technical agreements for water quality monitoring. At the municipal level, the project has contributed to the adoption of common standards for monitoring land

based rural and urban sources of pollution through the implementation of water quality monitoring campaigns. The project has played a key role in positioning the environmental and water quality RPF's issues within the agendas of both governments and has strengthened the governance for addressing environmental issues in border areas by including environmental authorities in the Directive Board of the project. It has also served for strengthening national capacities for enhancing access to oceanographic data, and for promoting the tuning of international predictive models of sediments circulation according to the local ecosystem specificities.

The project collaborated in the incorporation of management capacities in governmental institutions to ensure continuity in the implementation of the SAP and their commitment to its long-term objectives. Both DINAMA and SAyDS (environmental authorities) have taken action to retain the skills generated during the implementation of the project and incorporate them into their operational structures. This is evidenced by the creation of a national monitoring system within SAyDS aimed at coordinating the Information Exchange Network of Local Governments of the Rio de la Plata (RIIGLO), and the creation of a department of marine area in the DINAMA. There are also some actions initiated to strengthen the coordination mechanisms between La Comisión Administradora del Río de la Plata (CARP), Comisión Técnica Mixta del Frente Marítimo - Uruguay (CTMFM), and the national environmental authorities, to maintain the commitment to the project's objectives. The creation of positions in the framework of the CARP to support the Executive Secretary on issues related to ecosystem monitoring, and the resources allocated by CTMFM to the binational oceanographic surveys, are proof of the commitment to environmental issues in the transboundary area.

Stress Reduction Results

A number of pilot projects were developed and implemented to reduce and/or prevent pollution from land-based point and diffuse sources: wetland managements, tannery sector, and dairy sector. On wetland management, there have been some important achievements, particularly concerning the scope of sectorial agreements between provincial and national governments, and civil society, in the construction and operation of the artificial wetland in San Clemente. The project has played a substantial role as a catalyst and promoter of synergies for solving long-standing problems such as the ineffectiveness of the solid waste treatment plant, and inputs generation for the development of a management plan. The pilot project in the tannery sector had significant achievements in the development of cleaner production processes (CP), since it identified the main problems, and developed solutions, of each establishment. Similar results were achieved in the pilot trial in the dairy sector aimed at incorporating

- » The RPF receive the waters of the Rio de la Plata basin, the second largest river basin system in South America;
- » The basin is formed by three main watercourses: the Parana, with its primary tributary the Paraguay River, and the Uruguay River;
- » The Rio de la Plata is a very dynamic brackish and freshwater system, with considerable flow, scant depth, and a high load of sediments and particulate material from its many tributaries;
- » The rivers of the La Plata Basin carry an estimated 57,000,000 m³ of silt into the Río de la Plata each year.

CP processes and best practices to reduce industrial discharges. The project has developed efficient and effective procedures to improve the pollution management on the farms, reducing the load of pollutants discharged. The strategy has been similar to that in the tanning industry that has involved key producers committed to the CP. The project also developed communication procedures of CP and events to transfer the outcomes to the main cooperative of producers in the country. It also created value through innovative processes for waste treatment in the dairy sector, and sourced critical information for the environmental management duties performed by the relevant national authorities.



Oceanographic campaign for evaluation of water quality in La Plata River
© FREPLATA Project.

Also, the project had important achievements in developing communication procedures of cleaner production processes involving the Control and Environmental Performance Division (DCDA/DINAMA), the local government of Montevideo (IM), the Uruguayan Technological Laboratory (LATU), and the Uruguayan Chamber of Industries (CIU), and managed to implement cleaner production processes at the main cooperative of producers in the country. It also created value through innovative processes for waste treatment in the dairy sector, and contributed with valuable information for environmental management for the DINAMA, facilitating its articulation with the Ministerio de Ganadería, Agricultura y Pesca (MGAP) to seek for solutions to environmental problems in the dairy sector.

Environmental and Socioeconomic Status Results

Progress in relation to establishment and monitoring of environmental and socioeconomic status indicators was made in Uruguay and Argentina and as many of the demonstration projects on

cleaner production techniques in the tannery dairy's industries continue to reduce pollution loads to their respective sites, measurable improvements in environmental status (water pollution levels) should become discernible at site level.

Various modelling tools the project developed such as the sedimentology model (required among other things for climate change predictions, pollution problems related to contaminants release in sediment deposits) or the river internal currents model used to better understand the presence or absence of contaminants exchange between Argentina and Uruguay margins will further permit determination of specific trends of improving environmental status. Towards this same direction the project has helped strengthening local capacities by actions that contribute to product and innovation processes development, which include a) the redesign of information systems of the DINARA to provide oceanographic data, b) increasing the capacity of SOHMA to systematize historical data inaccessible systems, and c) strengthening research groups in oceanography, hydrography and engineering fluid mechanics in both countries.



An estuary in the Rio de la Plata © Wikimages.

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." 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 Rio+20 Outcome Document, the 2015 Sustainable Development Goals, UNFCCC, CBD, GPA/LBA and the 2014 Samoa Pathway Outcome document.

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' or 'source-to-sea' approach.

UNDP has been involved as a GEF Agency in a total of 21 IWRM/ICM projects and has cumulatively programmed \$121 million in GEF International Waters funding towards these ICM/IWRM programmes. This section reviews four project case studies from East Asia, Cuba, the Pacific SIDS and the SIDS surrounding the African continent. 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.

Integrated Water Resources and Coastal Area Management



Implementing Integrated Water Resource and Wastewater Management in Atlantic and Indian Ocean Small Island Developing States



Rain water harvesting installation on the island of La Digue, Seychelles © Sandra Folette, Project Manager, Public Utilities Corporation, Seychelles.

INFORMATION BOX

Scope: Regional

Countries: Cape Verde, Comoros, Maldives, Mauritius, São Tomé and Príncipe, and Seychelles

Partners: UNEP, UNOPS, UNDP-CapNet

GEF Grant: Total \$11.00 million; UNDP \$4.5 million

Co-Finance: \$39.72 million

Project Cost: \$55.22 million

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

Project Context

Water is a valuable and scarce resource in Small Island Developing States (SIDS). Water resources must be managed in an integrated manner, linked to other management tools and frameworks, such as catchment management, aquifer management, coastal zone management, wastewater management, waste management, etc. UNDP, in partnership with UNEP, supports the implementation of integrated water resources and wastewater management in six SIDS from the Atlantic and Indian Oceans: Cape Verde, Comoros, Maldives, Mauritius, São Tomé and Príncipe, and the Seychelles. The overall objective of the project is to accelerate progress towards the achievement of the World Summit on Sustainable Development (WSSD) targets on Integrated Water Resources Management (IWRM)/Water Use Efficiency (WUE) plans, building on existing political commitments. The project is working with communities to protect their water sources and to realise the socio-economic benefits derived from sustainable and safe water resources management. The project is implemented by UNDP and UNEP, executed by UNOPS and financed by GEF.

Threats and Causes

Threats to limited freshwater resources include pollution from agricultural practices, industrial activities, domestic wastewater and solid wastes in the catchment areas and saltwater intrusion due to over-extraction and/or sea-level rise. With growing populations and pressures to support economic growth, demand on limited water resources is steadily increasing. With climate change, the rise in sea level will push saltwater farther inland and contaminate aquifers.

Causes include: inadequate legal or regulatory frameworks to regulate agricultural and industrial activities; limited capacity for monitoring and enforcement of existing regulations; limited capacity to monitor water extractions as well as water consumption with a significant amount of unaccounted water in water supply system; limited water storage capacity, etc. Institutions are often weak and strained due to funding issues and limited available capacities. The root causes of the SIDS fragile water resources are: their small land masses; their limited natural storage capacity; and increasing pressure on land due to fast growing populations. These factors, coupled with generally limited resilience to natural and anthropogenic hazards, including drought, cyclones and urban pollution, make the SIDS water resources highly vulnerable.

Results Delivered

Process Results

During the project preparatory phase, a national diagnostic and a hotspot analysis have been delivered for each participating SIDS in order to identify targeted on-the-ground

IWRM demonstration activities. Through a series of IWRM demonstration activities on the ground, the project supports stakeholder engagement, awareness raising and heightening concerns regarding limited and vulnerable water resources.

In Cape Verde, increased utilisation of treated wastewater, as an alternative water resource for agricultural production, is promoted in the Municipality of Tarraffal to increase water availability during the dry season and improve the livelihoods of coastal communities. In Comoros, the watershed management plan for the Mutsamundu river basin was developed through a thorough stakeholder consultation process and based on the water resource and socio-economic assessment of the basin. The plan was adopted in 2015 by the government as the first ever watershed management plan developed in the country. The technical capacity to analyse water quality has been strengthened at a local institution. In the Maldives, the project is supporting the AA Thoddoo Island Council to reduce pressure on the groundwater lens that has been suffering from over-extraction, pollution and saltwater intrusion, by investing in the establishment of integrated water supply systems in the island that mixes harvested rainwater and desalinated water to meet domestic water demands. A number of sensitisation and training activities are planned to improve agricultural practices to reduce contamination of the lens. In Mauritius, the project is strengthening the government's technical capacity to monitor the status of one of the five aquifers in the island to enable better aquifer management; and sensitisation activities to raise awareness of the importance of the aquifer protection nationwide have been conducted. In São Tomé and Príncipe, an integrated watershed management plan was developed for the Provaz river basin through a participatory approach based on the water resource and socioeconomic assessment. In the Seychelles, water resources management issues have become a standing item to be discussed by the La Digue Advisory Board, a body appointed by the President to address the economic development of the Island, indicating their commitment to effective water resources management for sustainable development.

Stress Reduction Results

The project is designed to realise stress reduction at pilot scale, but it is too early to fully quantify all results.

In Cape Verde, halophytes species have been planted to minimize the effects of saltwater intrusion in the irrigated perimeter of Colonato, Tarraffal, where the project is promoting agriculture using treated wastewater. In the Anjouan Island of Comoros, 20 tons of solid waste was collected from the lower catchment of the Mutsamuntu River to protect water sources as part of the watershed management plan implementation efforts. In the Thoddoo Island of Maldives, the project investment is expected

- » A key threat to São Tomé and Príncipe's water resources is deforestation - rain forest cover has dropped to 28 percent of the land area;
- » During the 20th century, severe droughts experienced in Cape Verde killed 200,000 people and prompted heavy emigration. The country's last monsoonal rains were 18 years ago;
- » In Mauritius, an eight percent reduction in rainfall was observed between 1905 and 2007, while its potable water demand has recently been rising by an average of two percent annually;
- » The island of Grand Comoro has no significant rivers or streams so most of the population depends on rainwater gathered in large tanks;
- » In Comoros, seawater intrusion can reach as far as 2 km inland due to the high water table around the coast; groundwater contamination is worsened by seepage from septic tanks, substandard equipment and an insufficient number of water pumps;
- » The Seychelles' main island Mahé is under increasing threat of water shortages as a result of wilt disease that is damaging a tree species, *Pterocarpus indica*, important for watershed management;
- » In 2014, a fire at the only desalination plant in the Maldives' capital Malé left 120,000 people, one-third of the country's population, without tap water for several days.



Mauritius © Bernard Loo.

to provide a yearly mean rain water supply of 8619 m³ to the island population of 2,000 to reduce over-extraction of ground-water. The use of pesticides and fertilizers will be monitored as a proxy measure to monitor the reduction of excessive use of these chemicals that have been linked to skin diseases and other health risks for the island's population. To reduce pollution loads to the Provaz river basin, in São Tomé and Príncipe, the local authorities of the city of Neves are collecting 20 m³ of solid waste per month and five ecosan facilities are being constructed. In the La Digue Island of the Seychelles, various activities such as rainwater harvesting at private home and guesthouses, hazardous waste (e.g., batteries) collection, water storage capacity expansion, and marsh restoration, are promoted to reduce pressure on the island's limited water resources and raise awareness. The capacity of the island's sole desalination plant was increased by 600 m³. A 150 m³ storage tank was constructed to reduce peak demand pressure. The installation of rainwater reaping systems in households and small hotels has increased the rainwater harvesting capacity by 56 m³. In São Tomé, 4000 trees have been planted in the Provaz river basin as part of the integrated watershed management plan

implementation. Additionally, the municipality has established solid waste management and best practice waste guidance in the city of Neves.

Environmental and Socioeconomic Status Results

It is too early to measure the environmental and socioeconomic status results of the pilot project interventions. However, to establish baseline data, the project is conducting water resources and socioeconomic assessment studies in Comoros and São Tomé and Príncipe, where the existing data required to develop the IWRM plan was scarce. In Comoros, an agreement between the local municipality and an academic institution is under development to establish continuous water quality monitoring of the Mutsamundu river basin. In the Maldives and Mauritius, the project is strengthening its technical capacity to monitor the status of groundwater. All IWRM plans supported by the project include water resource monitoring as a key activity for the IWRM implementation. In Cape Verde, agricultural activities promoted by the project's pilot interventions are expected to improve the socioeconomic status of the local communities.



A team of workers building a water tank on Thoddoo island, in Maldives © Ishaq Ashraf, IWRM Project Manager, Ministry of Environment and Energy, Maldives.



Awareness raising activity on water preservation in Tarrafal, Cape Verde © Nuno Ribeiro, National Project Coordinator, Director of Natural Resources, Ministry of Environment, Housing and Planning, Cape Verde.



Maldives beach © DF7ZS.

Implementing Sustainable Water Resources and Wastewater Management in Pacific Island Countries



Tonga lake water © Tpsdave.

INFORMATION BOX

Scope: Regional

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

Partners: Secretariat of the Pacific Community

GEF Grants: \$7.21 million (UNDP); \$2.54 million (UNEP)

Co-Finance: \$81.96 million

Project Cost: \$91.71 million

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

Project Context

The 14 Pacific Small Island Developing States (SIDS) vary in their size, geomorphology, hydrology, economics and political approaches. The Pacific Islands represent an area of globally significant terrestrial, coastal and marine biodiversity, which many people of the Pacific depend upon for their livelihoods, food security, and economic development. As the Pacific SIDS share common environmental problems and the potential solutions to them, the need for international cooperation among the islands is strong in order to identify and utilise cost-effective and appropriate measures to protect water and coastal resources for environmental benefits, improved public health and the generation of sustainable livelihoods. The objective of this project was: *'to improve water resource and wastewater management and water use efficiency in Pacific Island Countries in order to balance overuse and conflicting uses of scarce freshwater resources through policy and legislative reform and implementation of applicable and effective IWRM (Integrated Water Resources Management) plans.'*

Threats and Causes

The water-related environmental threats faced by these SIDS include inadequate water and wastewater management, land-based sources of pollution, sediment erosion, and sea level rise causing saltwater intrusion on groundwater supplies. These threats impact unique island ecosystems, such as coral reefs, watersheds and seagrasses, and the myriad ecosystem services these provide. The project evolved from and responded to the Strategic Action Programme (SAP) for the International Waters of the Pacific developed with UNDP-GEF support and adopted by the Pacific Island nations in 1997. The SAP identified two overall solutions to these threats: a) Integrated Coastal and Watershed Management (ICWM), and b) Oceanic Fisheries Management (OFM). This project specifically addressed the ICWM component of the SAP, and was designed to address the principal root causes behind these threats to island sustainability, which included weak governance (policies, regulations, institutions) and inadequate capacity across the PICs..

Results Delivered

Process Results

The project's terminal evaluation concluded in 2014 that the GEF Pacific IWRM project was truly catalytic in the extent to which regional and national demonstration, replication, scaling-up, capacity building and co-financing was achieved. The project acted as a valuable entry point for strengthening integrated approaches to natural resource management across the Pacific SIDS. Via the adoption of a 'community to cabinet' approach to cross-sectoral land, water and coastal area

planning, the project significantly strengthened national coordination mechanisms through the operation of inter-linked national APEX bodies for IWRM and local coordinating committees for IWRM demonstration projects. These networks were effective in promoting stress reduction in the water and sanitation sectors and driving reform of national IWRM policy and planning. The project supported the Pacific SIDS in achieving transformational change in the national enabling environments for water resource and wastewater management, with the widespread advancement and adoption of IWRM policies and implementation plans.

Stress Reduction and Environmental and Socio-economic Status Results

A significant focus of the Pacific IWRM project was on national IWRM demonstration projects aimed at providing an opportunity for participating countries to implement, and experiment with new water and wastewater management models and methods. The national projects built local experience and capacity in project implementation, cross-sectoral coordination, and the conduct of water resource and socio-economic assessments and studies needed to contribute to more sustainable management of water resources. The practical on-the-ground solutions to water and sanitation issues demonstrated by the national IWRM projects galvanised support at both community and national government levels for policy reform and the mainstreaming of an IWRM approach as part of national development planning.

The demonstration projects produced direct local environmental results and benefits, and health co-benefits, from changes in practice. For example, practical demonstrations of IWRM resulted in significant stress reduction benefits in vulnerable atoll and low-lying island environments, largely via efforts to reduce impacts of human and pig waste on groundwater and coastal lagoon water quality, human health, and water security. The regional promotion of ecosanitation approaches has involved the installation of 40 composting toilets in Tuvalu that has resulted in a five percent reduction in sewage waste contamination of groundwater and lagoonal waters of Funafuti atoll. Economic analyses indicate a public health saving of almost two dollars for every one dollar invested in ecosanitation in Tuvalu, whereas the valuation of environmental benefits is ongoing. The composting toilet model piloted in Tuvalu has been subsequently replicated in Nauru, Tonga, the Marshall Islands, Vanuatu and the Federated States of Micronesia (FSM), with efforts underway to scale-up ecosanitation throughout Tuvalu via the installation of an additional 135 units with the support of the European Union. In the Republic of the Marshall Islands, the above efforts were complemented with the remediation of 18 percent of overloaded septic systems contaminating Majuro Atoll's Laura groundwater lens and the conversion of one commercial piggery and 20 household pig

- » The PICs of the Pacific Region are home to over nine million people, speaking about 1,200 languages, with the majority of Pacific Islanders (about 80 percent) living in rural areas;
- » The PICs have about 1,000 islands covering a land area of just over half a million square kilometres, spread across 180 million square kilometres of ocean;
- » The terrestrial and marine ecosystems supported across these islands are unique and among the most endangered in the world.

pens to waterless, dry litter composting systems, reducing nutrient loads entering groundwater and lagoon waters by an estimated 35 percent.

In Nauru, sanitation systems have been upgraded in 40 households across Ewa and Anetan and secondary treatment systems were installed to improve effluent prior to irrigation, and composting toilets were adopted in the country's schools, dramatically reducing water use, as well as providing sustainable sanitation to schoolchildren. In Niue, the establishment of a national waste oil collection and disposal system resulted in a 56 percent reduction in waste oil contamination. This was complemented with an increase in freshwater storage by over 45 percent and an increase in supply security by eliminating losses from freshwater distribution systems. Similarly, Tonga generated a significant reduction in nitrogen discharged to groundwater via provision of a septic pump-out service to 80 percent of Neiafu residents that has been augmented by an almost complete reduction of septic waste pollution from 11 demonstration household sites.

The Pacific IWRM project was completed in 2015 and its tremendous success helped to inspire and inform design of the new GEF Pacific Ridge-to-Reef (R2R) programme to address PICs environmental issues in a more holistic way employing the ridge-to-reef approach. The Ridge-to-Reef programme, approved in 2013, includes a new regional project, implemented by UNDP again through its partner SPC, that aims to test the mainstreaming of 'ridge-to-reef' (R2R) climate resilient approaches to integrated land, water, forest and coastal management in the PICs through strategic planning, capacity building and piloted local actions to sustain livelihoods and preserve ecosystem services. This new R2R programme builds extensively on the results, experience, lessons and enhanced capacity delivered to the PICs via the Pacific IWRM project.

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



Nha Trang Bay, Vietnam © Tpsdave.

INFORMATION BOX

Scope: Regional

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

Partners: The 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 Institute of Ocean Science and Technology (KIOST), Northwest Pacific Action Plan (NOWPAP), Ocean Policy Research Institute (OPRI), Oil Spill Response, Plymouth Marine Laboratory, PEMSEA Network of Local Governments (PNLG), Swedish Embassy, GEF Small Grants Programme, UNEP Global Programme of Action for the Protection of marine Environment from Land Based Activities (UNEP GPA), UNDP-GEF Yellow Sea Project (YSLME), West and Central Pacific Fishery Commission (WCPFC), China-PEMSEA Sustainable Coastal Management Cooperation Center, Centre for Marine Environment Research and Innovative Technology (MERIT), IW:LEARN, GIZ, Sulu Sulawesi Marine Ecoregion (SSME) Project

GEF Grant: \$36.10 million
(4 projects)

Co-Finance: \$94.12 million

Project Cost: \$130.22 million

Project website: www.iwcam.org

Project Context

The East Asian Seas have been facing increasing stress over the past few decades as a consequence of rapid economic growth, coupled with the expansion of maritime trade and global demand for marine products, as well as population increases, large scale migration of people and commerce to coastal areas.

In response to these threats, in 2003 the 11 East Asian Seas countries completed the development and ministerial level adoption of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA). In November 2015, an updated version of the strategy, the SDS-SEA 2015, was approved by the Fifth Ministerial Forum of the East Asian Seas Congress. The ongoing UNDP-supported and GEF-financed project is a follow-up phase of support, aiming to catalyse actions and investments at the regional, national and local levels to rehabilitate and sustain coastal and marine ecosystem services and build a sustainable coastal and ocean-based economy in the East Asian region.

Approaches for improved regional and national ocean governance include transforming PEMSEA into a self-sustaining international organisation; enhancing collaboration among LME programmes in the East Asian region and engaging local governments, civil society organisations, the business community and academia to achieve SDS-SEA targets and objectives; mainstreaming SDS-SEA objectives and initiatives into medium-term development and investment plans of participating countries; setting up a regional knowledge management platform for ocean governance and management; and developing and implementing a regional state of oceans and coasts reporting system.

Threats and Causes

Eleven percent of the region's coral reefs have collapsed in the last 30 years, while 48 percent are listed in critical condition. Mangroves in the region have lost 70 percent of their cover in the last 70 years. The loss of seagrass beds in the region ranges from 20 percent to 60 percent. In terms of land-based pollution, the estimates of domestic sewage treated prior to discharge amounts to only 11 percent, while billions of tonnes of industrial wastewater are being discharged annually from major coastal cities without pre-treatment. About 300 oil spills (over 200 million gallons of oil) have occurred in the region since the mid-1960s. Climate change, and associated sea level rise, flooding, ocean acidification and other hazards also pose a tremendous threat to the region. From 1995 to 2004, the cost of natural disasters in the region was estimated at more than \$300 billion in damages, and in excess of 445,000 human fatalities. Eight of the top 15 marine capture fish

producing countries in the world are in this region¹, with Asia now producing more farmed fish than wild catch²; nine of the top 10 container ports globally are in East Asia³; and bolstered by arrivals to Southeast Asia, international tourism in Asia-Pacific has shown stronger growth than other parts of the world at around six percent per year⁴. Recently, East Asia has been identified as one of the world's largest source areas of marine plastics to the oceans.

Continued increase in pressure on the existing resource base and exploitation of coasts and oceans is a certainty with a growing population, accelerating development, and increasing access to coastal and marine environments through technological advances. Behind these 'core' root causes, secondary causes of environmental degradation include weak regional, national and local ocean and coastal management institutions, inadequate capacity (institutional and individual), insufficient public awareness, lack of integrated, multi-sectoral, multi-stakeholder planning approaches such as ICM and lack of environmental financing opportunities.

Results Delivered

Process Results

A fully fledged regional coordinating mechanism for the implementation of the regional marine strategy, the Sustainable Development Strategy for the Seas of East Asia, has been realised. The final step in the nine-year transformation process was achieved with the Philippine Senate ratification of the Government of the Philippines-PEMSEA Headquarters Agreement on May 25, 2015, thereby providing PEMSEA with full immunities and privileges as an international organisation.

In July 2012, Ministers from PEMSEA Partner Countries signed the Changwon Declaration: "Toward an Ocean-based Blue Economy: Moving Ahead with the Sustainable Development Strategy for the Seas of East Asia". Countries developed a working definition for blue economy, and committed to optimise SDS-SEA implementation using the Integrated Coastal Management (ICM) framework to advance blue economy development. As of June 2015, through catalytic demonstration, replication and upscaling supported by PEMSEA over nearly 20 years, the total coastline covered by ICM in the region is estimated to be 31,500 km in 11 countries, or 14 percent of the region's coastline.

- » The Seas of East Asia are bordered by Brunei Darussalam, Cambodia, PR China, DPR Korea, Indonesia, Japan, Malaysia, Philippines, RO Korea, Singapore, Thailand, Timor Leste and Vietnam;
- » More than 1.5 billion people live within 100 km of the region's coasts;
- » Yellow Sea, East China Sea, South China Sea, Sulu-Celebes Seas, Indonesian Seas, Gulf of Thailand, Arafura and Timor Seas (part of the North Australian Shelf) are seven LMEs of great ecological and economic importance to the region;
- » This region is one of the most economically dynamic globally, with average annual growth rates among developing member countries of PEMSEA ranging from 3.6 percent (Thailand) to over 10.6 percent (China) between 2005 and 2012.

National five-year SDS-SEA implementation plans were developed in nine countries. Highlights of these plans include: continued scaling up of ICM to cover 25 percent of the region's coastline by 2021; addressing priority issues such as sustainable fisheries, habitat restoration and management; Disaster Risk Reduction Management (DRRM); and Climate Change Adaptation (CCA); pollution reduction and nutrient management; and sustainable livelihoods.

The China-PEMSEA Sustainable Coastal Management Cooperation Center was established in 2014, in collaboration with China's State Oceanic Administration, for coordinating the implementation of ICM in the country and for sharing good practices across the region.

As of April 2015, PEMSEA's Network of Local Governments (PNLG) currently embraces 37 regular members and two associate members committed to sustainable coastal development by applying the ICM Code and reporting on the state of their coasts. The PEMSEA Network of Learning Centers (PNLC) was launched in November 2015, at which time 15 outstanding institutions have been recognised for their contribution in advancing ICM through development, application and refinement of appropriate tools.

¹ The State of the World Fisheries and Aquaculture – Opportunities and Challenges, FAO, ROME 2014. <http://www.fao.org/3/a-i3720e.pdf>

² ibid

³ <http://www.worldshipping.org/about-the-industry/global-trade/top-50-world-container-ports>

⁴ World Tourism Organization Annual Reports 2013, Madrid 2013. http://www2.unwto.org/sites/all/files/pdf/unwto_annual_report_2013_0.pdf

PEMSEA has organised the East Asian Seas Congress since 2003 with the latest being held in Da Nang City, Vietnam in November 2015. This triennial event has become the premier thematic event in the region and has established its reputation as an intellectual marketplace and ocean-based forum that uniquely focuses on the world's most diverse and fastest-growing region. It provides a dynamic platform for knowledge sharing, collaborative action, partnership building and a forum to advance commitment and cooperation in achieving the shared vision of a sustainable East Asian Seas.

Stress Reduction Results

With PEMSEA supporting the piloting, replication and scaling-up of ICM programs across 12 PEMSEA participating countries, and many local and provincial ICM plans now under full implementation, a wide range of stress reduction is starting to be realised. Just a few highlights are described below.

The Coastal Fishermen Group of Karya Segara, Indonesia, was engaged in an ICM programme to monitor destructive fishing and coral reef collection activities. An innovative coral adoption programme was implemented to attract tourists to experience coral transplant on a fee-based scheme. With this programme, two hectares of degraded reefs have been restored with transplanted corals. The community fund from the fees also benefits a local livelihood programme. At present, Serangan Island has become a place of learning for many local governments, NGOs, academic institutions and community groups from various regions in and outside Indonesia.

Functional scaling up of ICM through integrated river basin and coastal area management was demonstrated in selected rivers in Bohai Bay and Xiamen Bay (China), and Manila Bay (Philippines), with a total watershed area of 680,000 km². In Bohai Bay, total pollutant loads, mitigation strategies and investment plans in Hai River, Daling River, Luan River and Guangli River were developed, and investment projects were identified to meet the offshore water quality criteria of various marine function zones. 163 mitigation projects totalling \$2.6 billion were invested in Hai River, Daling River and Luan River for mitigation of industrial pollution, urban sewage, aquaculture, agricultural runoff and restoration of coastal ecosystems.

In Puerto Galera, Philippines, the Sabang Sewerage Collection and Treatment System was designed to eliminate the direct discharge of domestic wastewater to the coastal area, improve the functionality of the existing wetland on the island, recharge groundwater, safeguard the quality of marine environment and health of the community and its visitors, estimated to be 400,000 every year.

To address sea-based pollution in the Gulf of Thailand, the three littoral countries of Thailand, Cambodia and Vietnam have worked jointly to strengthen and harmonize oil spill sensitivity maps, subregional guidelines on the use of chemical dispersants for oil spills, and information sharing on oil spill response.

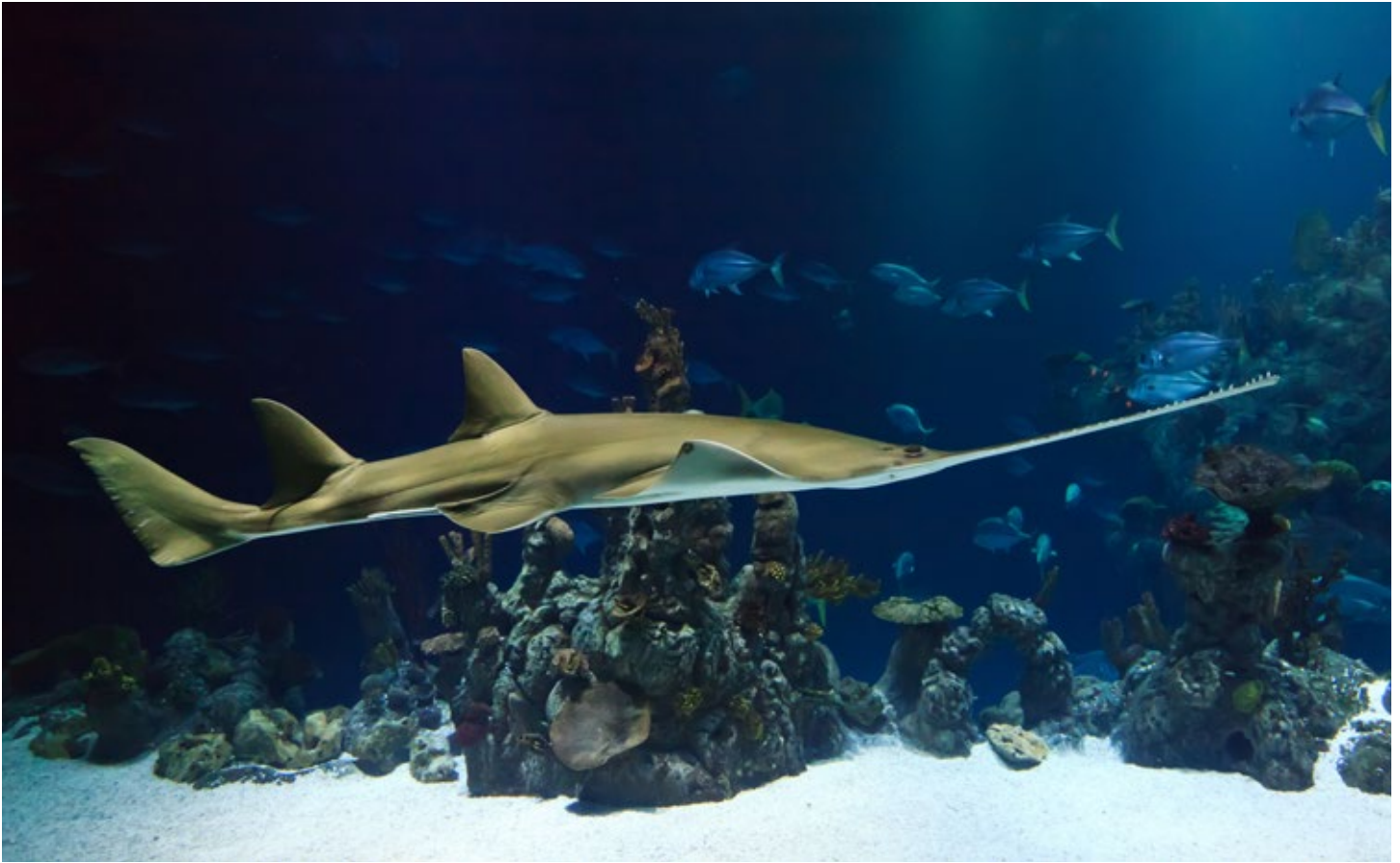
Environmental and Socioeconomic Status Results

With over 40 ICM programmes at various stages of implementation in the region, some have been operational long enough to deliver measurable environmental and socioeconomic improvements. Through its ongoing 'State of the Coasts' reports, PEMSEA and the East Asian Seas countries are developing tools for long-term monitoring of progress in SDS-SEA implementation across the region. A few examples are summarised below.

The vulnerable communities of Danang City of Vietnam became more resilient to coastal disasters. ICM programmes identified high-risk areas, particularly those affected by flooding and flash-floods, storm surges and erosion in updating the coastal use zoning plan. Communities inhabiting the rehabilitated coastal and riverside roads were relocated into safer apartment buildings not far from where they lived. Some 70,000 households, approximately one third of the population, were resettled during the past 10 years in the climate-resilient urban rehabilitation process.

The Philippine National Greening Program has successfully reforested 683,482 ha of open, denuded and degraded land, including nearly 10,000 ha of mangroves. The Program has reportedly generated over one million jobs for poor people living in upland and coastal areas.

Protection and conservation efforts in implementation of coastal use zoning plan in Xiamen (China) have improved resilience of Chinese White Dolphin (*Sousa chinensis*) by enlarging suitable habitat areas for the species as a consequence of the four-year restoration project for Wuyuan Bay. Now about 30-40 dolphins frequent the MPA in the western sea area and some are newly found in the restored Wuyuan Bay.



Sawfish © Petr Kratochvil.



Fishing boats, Thailand © Coffy.

Demonstration of Innovative Approaches to the Rehabilitation of Heavily Contaminated Bays in the Wider Caribbean



Community Awareness Activities © La Havana Bay Project.

INFORMATION BOX

Scope: National

Countries: Cuba

Partners: Ministerio de Ciencia, Tecnología y Medio Ambiente (CITMA), Instituto Nacional de Recursos Hidráulicos (INRH), Grupo de Trabajo Estatal de La Bahía (GTE), Ministerio de la Construcción (MICONS)

GEF Grant: \$4.04 million

Co-Finance: \$27.00 million

Project Cost: \$31.04 million

Project website: n/a

Project Context

The UNDP-supported and GEF-financed 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 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. The overall objective of the project is to promote the sustainable management of Havana Bay, as well as disseminating and replicating successful sustainable management initiatives for other bays in the country and the region. The specific objective of this project is to demonstrate and promote innovative technologies and legislative and educational reforms to reduce pollution in Havana Bay and the Greater Caribbean.

Threats and Causes

Studies from the pilot phase project demonstrated the problem of eutrophication due to excess nutrients emissions into Havana Bay. These nutrients derive from land-based sources of pollution, whether of domestic origin or from agricultural and industrial activities that discharge into the Bay through rivers, sewage collectors, urban drains or directly from polluting sources located on the coast. Although environmental conditions have been gradually improving, nutrient concentrations remain high in the Bay, jeopardizing its environmental quality, as well as the zone of coastal interaction and adjacent international waters.

Results Delivered

Process Results

Havana Bay and its adjoining coastal area of interaction has been declared an 'area under integrated coastal management regime' by the government, and the Programme for the Integrated Management of Havana Bay, Coastal and Tributary Basin was approved. Environmental monitoring for controlling the environmental quality of the Bay and the adjacent coastline is under implementation. Several programmes have been developed under the project framework, such as: the corporate programme for environmental management and culture; the programme for community work and environmental education in 46 popular councils and schools in the area of intervention; and the reforestation programme located on the drainage basin of Havana Bay. As part of the project, the

Development Study for sewer and storm drainage has been updated, and the capacities of national, sectoral and local institutions involved in the project have been strengthened.

Stress Reduction Results

Results of this Project are focused on collecting and treating wastewater, particularly from the Luyanó River tributary, towards restoring Havana Bay and protecting adjacent international waters from this nutrient 'hot spot'. In the municipalities of the Bay watershed, the water supply networks have been rehabilitated by the National Institute of Hydraulic Resources.

Construction of the new Luyanó River wastewater treatment plant (WTP), co-financed by the UNDP-GEF Project and the Cuban government, is scheduled for completion in 2015. Once completed and operational, the facility will reduce nitrogen and phosphorus loads to the river by 50-70 percent with corresponding improvements in Havana Bay water quality, and contributing substantially to the overall ecosystem recovery effort. 90 percent 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 have also taken place, including recycling of industrial waste. In total, industries in the area have progressively reduced their pollution by an estimated 50 percent or more.

The demonstration project *Zero Emission Building* has also been completed and includes facilities with low consumption plumbing systems and wastewater treatment and reuse.

- » The project is strengthening management of municipal solid waste and contingency plans for oil spills;
- » The project will substantially contribute to a more beautiful and sustainable Bay, restoring the environmental and cultural heritage of Havana;
- » The incorporation of this project among the actions of the Provincial Environmental Strategy of Havana has allowed a greater involvement of the Provincial and Municipal Government of La Habana and Municipalities of 10 October and San Miguel del Padron in the monitoring of Lozano IV Wastewater Treatment Plant.

Environmental and Socioeconomic Status Results

The actions developed under the project framework have improved environmental conditions, as well as aesthetic and scenic qualities of the Bay ecosystem. Sanitary and health conditions have improved in the communities of San Miguel del Padrón with the installation of a sewage collection system. The collection and disposal systems of the Wastewater Treatment Plant have contributed to a decrease in industrial pollutant loads generated and released to the ecosystem of the Bay and its tributary basin. Increases in forest cover in the Bay watershed, habitat restoration, and sustainable management of water, have generated positive results for Havana Bay's coastal and marine biodiversity.



Wastewater Treatment Plant Aerobic Reactor © La Havana Bay Project.



View of Havana from across Havana Bay © Ialoga.

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.

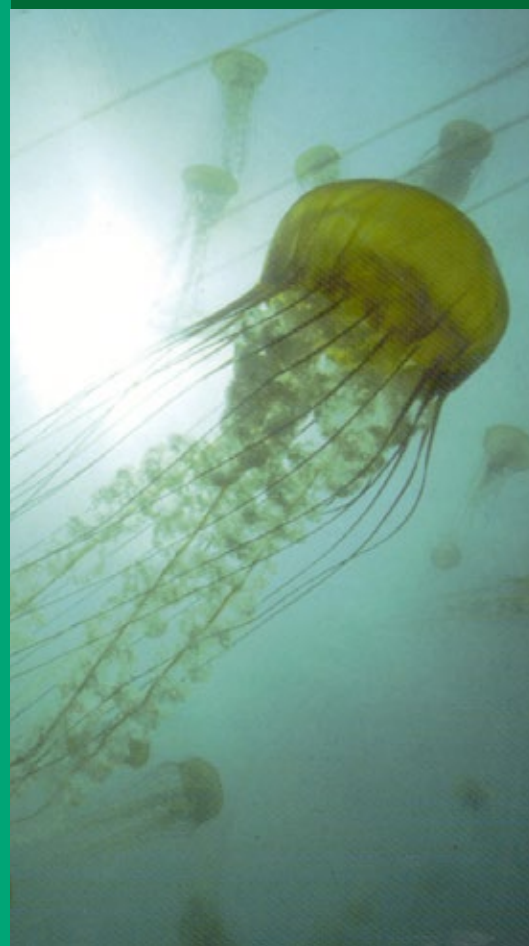
UNDP-GEF is helping to reduce global POPs contamination through its POPs portfolio of 85 projects valued at \$198 million in GEF grants. These projects are helping to reduce releases of polychlorinated biphenyls (PCBs), DDT and other POP pesticides, dioxins, and chemicals into the marine and freshwater systems from sources ranging from hospital waste to electrical equipment to anti-fouling paints. With the GEF now serving as the financial mechanism for the Minamata Convention on Mercury, UNDP has developed a portfolio of 18 mercury pollution reduction projects valued at \$6 million.

Most notably, UNDP-GEF has partnered with the International Maritime Organization (IMO) of the UN in a 18-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. In 2015, UNDP and IMO launched the GEF-financed Global Maritime Energy Efficiency Partnership Project (GloMEEP) that aims to reduce the shipping industry's global carbon footprint through improved efficiency in ship design and operation. GloMEEP builds extensively on the design structure and experience of GloBallast in transforming the global shipping industry towards a more sustainable path.

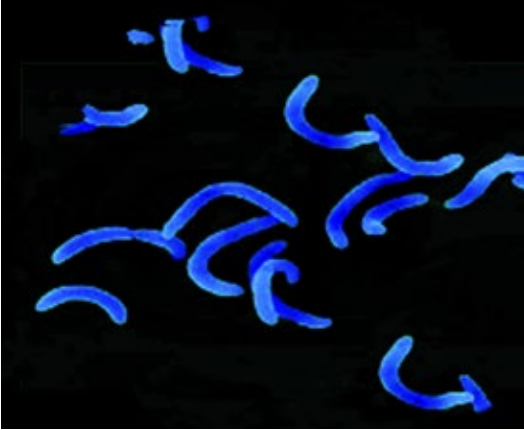
Back in 1998, the GEF and its agencies recognised that many of the challenges facing the world's transboundary marine and freshwater systems, such as overfishing, conflicting water uses, pollution and habitat loss, were common across many of the shared waters systems the GEF was targeting for support 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), 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 18 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 4 projects addressing global water/oceans issues and in 14 portfolio learning projects; UNDP-GEF has cumulatively programmed \$23 million in GEF grant resources to address global water and ocean issues, and has allocated \$31 million towards GEF International Waters portfolio learning.

Global Programmes



Global Ballast Water Management Programme (GloBallast)



Cholera.

INFORMATION BOX

Scope: Global

Countries: Pilot phase: Brazil, China, India, South Africa, I. R. of Iran, Ukraine
2nd phase: Argentina, Bahamas, Chile, Colombia, Croatia, Egypt, Ghana, Jamaica, Jordan, Nigeria, Panama, Trinidad and Tobago and Turkey.

Partners: GEF, IMO

Regional Coordinating Organisations:
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 (WМУ), 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: \$12.41 million
(2 projects)

Co-Finance: \$26.19 million

Project Cost: \$38.60 million

Project website: <http://globallast.imo.org>

Project Context

Invasive aquatic species are now recognised as one of the most significant threats to both marine and freshwater biodiversity. They can have serious environmental, economic and health impacts which can impair human development. Impacts of invasive species that establish themselves in new environments include reduction in fisheries production, competition with or elimination of other species, damage to marine infrastructure, damage to aquaculture operations, beach closures, disease outbreaks and others. IMO estimates that annual global socioeconomic costs of invasive aquatic species may be up to \$100 billion per year, underscoring the scale and severity of the issue. International shipping, via ship's ballast water and hulls (fouling), is widely recognized as the most significant vector for invasive species transfer across the world oceans.

The UNDP-supported and GEF-financed IMO GloBallast Partnerships Programme (or 'GloBallast') is a project to sustain global momentum in tackling the ballast water invasives problem and to catalyse innovative global partnerships. The main goal of GloBallast is to assist developing countries to reduce the transfer of harmful aquatic organisms in ships' ballast water. With the help of tools developed and lessons learned from the Pilot Project (2000-2004), this Programme is working to expand government and port management capacities; instigate legal, policy and institutional reforms at national level; develop mechanisms for sustainability and drive regional coordination and cooperation. GloBallast is mainly collaborating with 15 Lead Partnering Countries (LPCs): Argentina, Bahamas, Chile, Colombia, Croatia, Egypt, Ghana, Jamaica, Jordan, Nigeria, Panama, Trinidad and Tobago, and Turkey; and also supports more than 70 Partnering Countries (PCs).

Threats and Causes

The principal 'root' cause of invasive species transfer via the shipping vector is the lack of an international legal mechanism requiring the shipping industry to internalize the costs of avoiding invasive species transfers in ship design and operations that treat ballast water to an acceptable level. Other root causes include lack of appropriate national and regional ballast water policy and legislation; differences in approaches, legislation and enforcement across countries; lack of suitable ballast water treatment technologies; and the lack of a level 'playing field' created by these diverse approaches in the absence of an international legal regime.

Results Delivered

Process Results

All 15 lead partnering Countries (LPCs) of the GloBallast Programme have fully functional National Task Forces (NTFs) and identified Lead Agencies (Las). The 15 LPCs have

drafted a National Ballast Water Management Strategy (NBWMS) and 11 have officially adopted it, while the remaining four are on track to adopt it. National interventions to initiate national strategy development in 50 non-LPCs have been organized either through GloBallast missions to the countries or via twinning between a LPC and a neighboring Partnering Country (PC). National legislation has been passed by three LPCs (Croatia, Colombia and Nigeria). Draft National Legislation was developed by 12 LPCs (Argentina, Chile, Egypt, Nigeria, Ghana, Jordan, Turkey, Jamaica, Panama, Trinidad & Tobago, Venezuela and Yemen). The Bahamas have started studying possible revision of existing legislation on marine pollution to include ballast water management (BWM) or drafting of new legislation. 14 LPCs have completed a national ballast water status assessment. 11 LPCs have drafted a national economic assessment, and the other four LPCs are making progress towards drafting such an assessment. Six LPCs (Croatia, Egypt, Jordan, Nigeria, Trinidad and Tobago, and Turkey) have ratified the BWM Convention, with Argentina and Ghana soon to do so. All LPCs have contributed to the Regional Strategy Development process in their respective regions. In six regions, Regional Task Forces (RTFs) have been established and have finalised BWM Regional Strategies (South America, Caspian, Red Sea, Mediterranean, South Pacific and Wider Caribbean). In South America and the Mediterranean, the regional strategies have been adopted by the respective regional environmental conventions. The Mediterranean has an interim BWM regime. The Wider Caribbean and Caspian Regional BWM Strategies were endorsed at the respective regional Convention meetings. The South Pacific region has a fully approved and operational Regional Strategy on marine invasive species in general. Draft regional strategies have also been developed in two other non-GloBallast regions (South-East Asia and South Asia).

In 2004, a series of international negotiations facilitated by IMO led to the adoption of the International Convention on the Control and Management of Ships' Ballast Water and Sediments. The GloBallast programme has assisted a number of its partner countries in taking the steps necessary to ratify the convention. As of December 2015, the BWM Convention is now on the verge of Entry into Force with the recent ratification from Morocco where GloBallast organized two national seminars on BWM in 2012 and in 2014, bringing the total number of parties to 45 representing 32.93 percent of the world tonnage. Only about two percent of tonnage are now needed to meet the Entry into Force criteria of 35 percent.

Stress Reduction Results

The GloBallast Programme has put in place several partnerships one of the most important being the Global Industry alliance (GIA) which is a public-private partnership where the shipping industry is funding activities supervised by the GloBallast Project Coordination Unit (PCU).

- » The zebra mussel (*Dreissena polymorpha*) native to the Caspian and Black Seas was introduced and are now established in the UK, Western Europe, Canada and the USA. They cause significant economic damage and were recently nominated as among 100 of the 'World's Worst' invaders;
- » Invasive species have been identified as one of the four greatest environmental threats to the world's oceans, along with land-based sources of pollution, over-exploitation of living marine resources, and physical alteration/destruction of marine habitats;
- » The voracious North American comb jelly (*Mnemiopsis leidyi*) was introduced via ships' ballast water to the Black, Azov and Caspian Seas, contributing to the collapse of fisheries in these seas, with massive economic and social impact;
- » The North Pacific Seastar (*Asterias amurensis*) has been transported in ballast water from the northern Pacific to southern Australia, causing significant economic loss as it feeds on commercially valuable scallop, oyster and clam species.

One of the activities organized under the umbrella of the GloBallast and the GIA is the GloBal TestNet which is a formal group of organizations involved in testing for the certification of ballast water treatment systems. A Memorandum of Understanding (MoU) establishing the GloBal TestNet was signed on 21 October 2013 by representatives of



Crab Zoea. Almost all marine species have a larval stage, which makes them excellent candidates for being transported by ships' ballast water
© Roger Steene.

16 ballast water treatment system testing organizations. The signing of the GloBal TestNet MoU follows four years of discussion among testing organizations, which have met several times under the auspices of the Global Industry Alliance (GIA), established within the framework of the GloBallast Partnerships Programme. The GloBal TestNet aims to achieve greater levels of standardization, transparency and openness in the process of technology approvals and thus raise the standards of quality control and quality assurance, in what can be a complex testing process. This was established to address one of the major concern of the private sector regarding transparency of testing procedures of ballast water management treatment systems.

GloBallast is also organizing every 2 years the IMO-GloBallast R&D Forum and Exhibition on BWM which is one of the most important international conferences on BWM. It aims at bringing together regulatory bodies, the maritime industry, academia, leading scientific experts and technology development leaders in the field of ships' ballast water management for a comprehensive overview of this rapidly expanding area of research and development and technology commercialization.

Through these different activities, GloBallast is therefore playing a catalytic role to ensure stress reduction is in place according to the BWM Convention requirements and to prepare countries and the shipping

industry for effective implementation of the Convention once it enters into force.

Environmental and Socioeconomic Status Results

Under the first and second phases of the GloBallast Programme, Port Biological Baseline Surveys (PBBS) have been carried out in the different Pilot and Lead Partnering Countries. These provide baseline information on existing species distribution in a given locale against which potential introductions can be documented. Extensive ballast water risk assessments based on those port baselines studies have been especially carried out in Brazil, China, India, South Africa and Ukraine. The outcome was the creation of a risk assessment database used to assess the potential risk from ships coming to those ports and was used as a decision making tool by port authorities when implementing the BWM Convention. In the second phase of the Project, PBBS trainings have been carried out in most LPCs, and Turkey has developed a new risk assessment software based on the risk assessment methodology of the first phase. Taking into account the source and recipient ports, as well as ship and voyage particulars, the system gives an estimated risk level for each vessel. Hence, inspections can be targeted on ships which are assigned the highest level of risk.



Ship discharging ballast water at port © F. Haag.



Swarms of invasive white-spotted jellies have impacted ecosystems in the Gulf of California, Gulf of Mexico, and Caribbean Sea. White jellyfish © zcool.com.cn.

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



Parvin Farschi, Project Manager of the UNDP-GEF Caspian Sea Project © Mish Hamid.

INFORMATION BOX

Scope: Global

Countries: Global

Partners: United Nations Environment Programme, United Nations Education, Scientific and Cultural Organization, United Nations Economic Commission for Europe, United Nations Industrial Development Organization, United Nations University, Conservation International, Global Water Partnership, International Commission for the Protection of the Danube River, International River Foundation, International Union for the Conservation of Nature, The Nature Conservancy, World Wildlife Fund.

GEF Grants: \$20.18 million
(4 projects)

Co-Finance: \$28.07 million

Project Cost: \$48.25 million

Project website: <http://www.iwlearn.net>

Project Context

The Global Environment Facility's International Waters: Learning Exchange and Resource Network (GEF IW:LEARN) is a partnership, implemented jointly by UNDP and UNEP, to share knowledge and build management capacity of the GEF International Waters (IW) Portfolio of projects and partners. Ultimately, the objective of IW:LEARN is to enhance the efficiency and effectiveness of GEF IW projects to deliver tangible results. IW:LEARN undertakes this objective via a line of signature services including: the iwlearn.net website; targeted training workshops; technical support services; portfolio-wide learning through the GEF Biennial International Waters Conference(s); global and regional dialogue processes; information synthesis and dissemination; programmatic guidance; online communities of practice; and a help desk. IW:LEARN's main objective is to strengthen global portfolio experience through sharing and learning by dialogue facilitation, targeted knowledge sharing and replication to enhance the efficiency and effectiveness of GEF IW projects to deliver tangible results in partnership with other IW initiatives.

Threats and Causes

Through its various supporting activities, IW:LEARN supports all GEF International Waters projects of all ecosystem types addressing threats and causes identified in TDAs. Moreover, the current phase of IW:LEARN revised the TDA-SAP Methodology that guides all GEF IW projects during their foundational phase, when they prepare TDAs and SAPs. (www.iwlearn.net/manuals). IW:LEARN continues to support revisions to the existing TDA-SAP methodology and training course, in order support the improved delivery of quality TDA's and SAPs.

Results Delivered

Process Results

Over the last 15 years, IW:LEARN has helped the GEF IW community to grow from an informal network of a few projects and agency staff to more than 1,000 individuals from over 200 local, national, and international organizations, governments, and research institutions. During that time, IW:LEARN has hosted over 95 workshops, trainings, and conferences generating an unprecedented level of capacity building and knowledge-sharing on a diverse range of transboundary water issues. From addressing upstream pollution and poor agricultural practices in neighboring countries, to securing sustainable fishing and maintaining marine ecosystem services, to adapting to the effects of climate change on Small Island Developing States, the community and resources fostered and promoted by IW: LEARN have become an essential part of the GEF IW portfolio.

IW:LEARN's Added Value: The View of the IW Community

1. IW:LEARN Facilitates New Partnerships:

Across the different IW community members, it is apparent that IW:LEARN facilitated meetings have been influential in creating new partnerships with other projects or institutions. Overall, 67 percent agreed that IW:LEARN has been influential in creating new partnerships with other projects or institutions.

2. IW:LEARN Improves Project Management:

The GEF International Waters portfolio varies across many different types of water bodies that can occasionally make knowledge management difficult. However, one important aspect of all GEF IW projects is project management. IW:LEARN also focuses heavily on improving the project management skills of the IW community. The preliminary results of the survey suggest that project staff credit IW:LEARN workshops and twinnings with helping them overcome project implementation barriers.

3. Private Sector Engagement:

IW:LEARN has been at the forefront of facilitating project engagement with the private sector through training of project staff and networking opportunities. Preliminary results from the survey suggest that IW:LEARN International Waters Conferences have been instrumental in empowering IW projects with the knowledge to engage the private sector. 70 percent of respondents agree that IW:LEARN has given IW project staff and partners the necessary knowledge to engage with the private sector.

4. Fostering the IW Community:

To date, IW:LEARN has successfully delivered services to over 225 GEF IW-funded projects addressing issues of freshwater and marine resource use, including connecting over 1,260 individuals from more than 475 public and private sector organizations, and local, national, and international government and non-government organizations.

5. IW:LEARN Website:

To many, the IW:LEARN website (www.iwlearn.net) is one of the programme's first attributes that immediately comes to mind. The website is the central tool for many of IW:LEARN's services. Currently, 100 percent of all existing IW projects (and over half of closed projects) supply project results to the IW:LEARN website. The IW:LEARN website now hosts over 3,717 documents and receives, on average, over 8,300 unique monthly hits, a 415 percent increase from the roughly 2,000 average hits in 2011. Overall, the IW:LEARN website has received a total 1.3 million hits – including 27,000 unique visitors – from more than 120 countries since it became operational, and one in ten visitors bookmarked the website. Over

GEF IW:LEARN BY THE NUMBERS:

- » Average number of unique website hits per month: 8300;
- » Number of GEF IW portfolio-wide meetings conducted: 7;
- » Total number of IWC attendees: 1898 (IWC 1-7);
- » Number of Project-Project Exchanges: 22 with 156 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 (inc. 2 project exchanges);
- » Number of training workshops held on Information and Technology issues: 15;
- » Number of people attending all workshops: 691.

77 percent of GEF IW project staff indicated they use the IW:LEARN website in their regular work. The IW:LEARN website also hosts many ongoing IW project websites through the project's website toolkit application. The toolkit is a free and customizable solution for projects. IW:LEARN's role however, is to ensure that as many active GEF IW projects as possible maintain websites, whether using the toolkit or not. The website has 43 toolkits in operation and some 54 percent of the active GEF IW projects are now able to disseminate their news, information and events in a simple, easy-to-use and consistent format.

6. IW:LEARN Visibility:

During the latest phase of IW:LEARN, a portfolio visualization tool and decision support application linked to information resources across the IW:LEARN website have been developed to provide



Adriatic coast near Dubrovnik, Croatia © Max Gudczinski.

access to project data using a variety of open-source global maps. Three distinct visualization tools have been created. The portfolio visualization tool displays past and ongoing IW projects on a global map and can be organized and visualized on the basis of ecosystem type, project office location, implementing agency, project type, and more. Geonode allows the user to explore a variety of maps produced from existing content or upload, create and share new spatial data. This customizable tool enables projects to generate custom maps for their own purposes. The Portfolio Results Archive uses data collected from the IW Tracking Tools to display the progress and results of IW projects on a global map. This trio of innovative features allows GEF projects and agency staff, stakeholders, as well as the general public, to see the global impact of GEF IW interventions, and connects users to in-depth information about each project for continued learning.

7. Training Workshops:

The influence of IW:LEARN does not just end with a virtual presence. In fact, a key added value of IW:LEARN is the cross portfolio learning through a number of workshops, trainings, and conferences hosted by IW:LEARN. To date, IW:LEARN has conducted over 23 workshops for more than 691 beneficiaries from some 129 projects. Targeted workshops are the main conduit through which management capacity is improved among project managers and project partners in the regions. These are demand-driven, face-to-face learning events focusing on one or more key themes requested by projects and their partners, and provide a ripe environment for networking and the sharing of experiences, during and after the event. The links forged at these meetings provide a continual transfer of lessons learned and management know-how between projects, thereby leading to further capacity-building and demand for replication at national and basin levels.

8. Project-Project Twinning:

No two GEF IW projects are alike, but many IW projects face similar challenges or are tasked with addressing similar transboundary issues. Another successful way for projects to learn from each other is to match-up two or more similar projects, even if they are in different parts of the globe, through what IW:LEARN calls 'project twinning exchanges'. A twinning generally involves staff and/or stakeholders from the selected projects traveling to one another's offices on brief study trips to learn about how their counterparts are addressing common issues. Twinning has successfully built capacity of project and government staff in peer projects to allow for better project implementation and results, natural resource management, and higher success of sustainability. For example, 75 percent of project managers identified twinning as a key tool in helping them overcome project management barriers. To date,

IW:LEARN has facilitated 22 twinning involving 156 beneficiaries as part of 36 GEF IW projects.

9. Conferences:

The signature learning event of IW:LEARN is the biennial GEF International Waters Conference (IWC). Because the GEF IW focal area is without an international convention that is in force and effect (i.e., with sustainable public funding) that attracts the key stakeholders to a regular gathering, the International Waters Conference was bred out of necessity. By the end of 2013, IW:LEARN has hosted seven IWCs across the globe. Since 2000, seven IWCs have assembled over 1600 attendees, averaging about 69 GEF IW projects from 70 countries represented at each conference. These events bring together IW projects, government policy makers, GEF and partner agencies, NGOs, the private sector, universities and more for a four-day intensive learning programme. In addition, a two-day capacity building workshop on a topic of portfolio-wide significance typically precedes the conference. An impressive 88 percent of IWC participants affirm that IWCs are relevant to their work. Moreover, more than half of all IWC participants have reported that an IWC has helped them form new partnerships to advance project goals.

10. Technical reports and knowledge dissemination:

The knowledge within IW:LEARN continues to grow each month, and has become an invaluable resource for members of the IW Community and beyond. The IW:LEARN website hosts thousands of documents related to specific projects, including over 100 project-specific experience and results notes. Additionally, IW:LEARN has also consolidated, analysed, and reported on the wealth of information. On its website, IW:LEARN has published the following knowledge products: 1) Handbook on Governance and Socioeconomics of Large Marine Ecosystems; 2) Turning the Tide: Large Marine Ecosystem video; 3) TDA-SAP Methodology & GEF Project Management Manual; 4) Gender and Water Online Exhibit; 4) GEF IW Community to Cabinet Publication, 5) From Ridge to Reef: Water, Environment, and Community Security, 6) The Public Private Partnerships Guidebook. These knowledge products, together with hundreds of technical reports and publications from the IW:LEARN community, have been disseminated to the community in a number of ways, including, over 44 ebulletins and 14 newsletters.

ACRONYMS and ABBREVIATIONS

\$	US dollar	DIKTAS	Dinaric Karst Transboundary Aquifer System (DIKTAS)	ICS	International Chamber of Shipping
ACB	Asian Centre for Biodiversity	DINAMA	National System of Protected Areas - Uruguay	IFMP	Integrated Fisheries Management Plan
ACLME	Agulhas Current Large Marine Ecosystem	DRC	Democratic Republic of the Congo	IGCC	Interim Guinea Current Commission
AfDB	African Development Bank	DRRM	Disaster Risk Reduction Management	IGRAC	International Groundwater Resources Assessment Centre
AIG	Alternative income generating activities	EAFM	Ecosystem approach to fisheries management	IMO	International Maritime Organization
APL	Global container transportation company	EBM	Ecosystem-based management	INWEB	Thessaloniki International Network of Water-Environment Centres for the Balkans
ASEAN	Association of Southeast Asian Nations	EBRD	European Bank for Reconstruction and Development	IOC	Intergovernmental Oceanographic Commission
ATSEA	Arafura and Timor Sea Ecosystem Action Programme	EEZ	Exclusive Economic Zone	IOC	WESTPAC IOC Sub Commission for the Western Pacific
BCC	Benguela Current Commission	EIA	Environmental Impact Assessment	IOI	International Ocean Institute
BCLME	Benguela Current Large Marine Ecosystem	EMECs	Environmental Management of Enclosed Coastal Seas	IUCN	International Union for Conservation of Nature
BOD	Biochemical oxygen demand	EPSMO	Environmental Protection and Sustainable Management of the Cubango-Okavango River Basin	IUU	Illegal, unreported and unregulated fishing
BP	British Petroleum	EU	European Union	IW	International Waters
CARP	Comisión Administradora del Río de la Plata	FAO	Food and Agriculture Organization of the United Nations	IWC	International Waters Conference
CaspEco	The Caspian Sea: Restoring Depleted Fisheries and Consolidation of a Permanent Regional Environmental Governance Framework	FSM	Federated States of Micronesia	IWCAM	Integrating Watershed and Coastal Area Management in Caribbean Small Island Developing States
CBD	Convention on Biological Diversity	GCLME	Guinea Current Large Marine Ecosystem	IW:LEARN	International Waters Learning Exchange and Resource Network
CCA	Climate Change Adaptation	GDP	Gross Domestic Product	IWRM	Integrated Water Resource Management
CEP	Caribbean Environment Programme	GEF	Global Environment Facility	JPOA	Johannesburg Plan of Action
CERMES	Centre for Resource Management and Environmental Studies, Barbados	GIA	Global Industry Alliance for Marine Biosecurity	KEI	Korean Environment Institute
CI	Conservation International	GISP	Global Invasive Species Programme	KIOST	Korea Institute of Ocean Science and Technology
CITMA	Ministerio de Ciencia, Tecnología y Medio Ambiente de Cuba	GIWA	Global International Water Assessment	km²	square kilometre
CLME	Caribbean Large Marine Ecosystem	GIZ	German Technical Cooperation	km³	cubic kilometre
CLME+	Caribbean and the North Brazil Shelf Large Marine Ecosystems	GloBallast	Global Ballast Water Management Project	KMI	Korean Maritime Institute
CMC	Coastal Management Center (East Asian Seas)	GloMEEP	Global Maritime Energy Efficiency Partnership Project	LME	Large marine ecosystem
CORB	Cubango-Okavango River Basin	GTE	Grupo de Trabajo Estatal de La Bahía	LPC	Lead Partnering Countries
CORDIO	Coastal Oceans Research and Development – Indian Ocean East Africa	GWP	Global Water Partnership	LTA	Lake Tanganyika Authority
CP	Cleaner Production	GWP-MED	Global Water Partnership Mediterranean	m	metre
CPPS	Permanent Commission for the South Pacific	ha	hectare	m³/sec	cubic metres per second
CRFM-CARICOM	Caribbean Regional Fisheries Mechanism of the Caribbean Community	IADB	Inter-American Development Bank	MEDA	Marine Ecosystem Diagnostic Analysis
CTMFM	Comisión Técnica Mixta del Frente Marítimo - Uruguay	IAEA	International Atomic Energy Agency	MERIT	Centre for Marine Environment Research and Innovative Technology
DDT	Dichlorodiphenyltrichloroethane	IAH	International Association of Hydrogeologists	MICONS	Ministerio de la Construcción
DFID	Department for International Development	IAS	Invasive alien species	MoMAF	Ministry of Marine Affairs and Fisheries
		ICAM	Integrated Coastal Area Management	MoU	Memorandum of Understanding
		ICFRMP	Integrated Coastal and Fisheries Resource Management Plan	MPA	Marine Protected Area
		ICM	Integrated Coastal Management	MSIOA	Multi-Sectoral Investment Opportunity Analysis
		ICRAF	World Agroforestry Centre	MVOTMA	Ministerio de Vivienda, Ordenamiento Territorial y Medio Ambiente - Uruguay

NAP	National Action Programme	RPMF	Rio de la Plata and its Maritime Front	WPEA-SM	Sustainable Management of Highly Migratory Fish Stocks in the West Pacific and East Asian Seas
NFRDI	National Fisheries Research and Development Institute	RSAP	Regional Strategic Action Programme	WSSD	World Summit on Sustainable Development
NGO	Non Government Organisation	RTF	Regional Task Force	WUE	Water Use Efficiency
NICs	National Inter-Ministerial Committees	SADA	Shared Aquifer Diagnostic Analysis	WWF	World Wildlife Fund
NOAA	National Oceanic and Atmospheric Administration	SAP	Strategic Action Programme	YSLME	Yellow Sea Large Marine Ecosystem
NOWPAP	Northwest Pacific Action Plan	SayDS	Secretaría de Ambiente y Desarrollo Sustentable		
NSAS	Nubian Sandstone Aquifer System	SCS	Sulu-Celebes Sea		
NUFFIC	Netherlands Organisation for International Cooperation in Higher Education	SDS-SEA	Sustainable Development Strategy for the Seas of East Asia		
OBIS	Ocean Biographic Information System	SGP	UNDP-GEF Small Grants Programme		
OFMP	Pacific Islands Oceanic Fisheries Management Project	SICA	Central American Integration System		
OKACOM	Permanent Okavango River Basin Commission	SIDA	Swedish International Development Cooperation Agency		
OPRI	Ocean Policy Research Institute	SIDS	Small Island Developing States		
ORASECOM	Orange-Sengu River Basin Commission	SOMER	State of the Marine Environment Report		
OSCE	Organization for Security and Cooperation in Europe	SPREP	Secretariat of the Pacific Regional Environment Programme		
OSPESCA	Organisation of the Fisheries and Aquaculture Sector of the Central American Isthmus	SSME	Sulu Sulawesi Marine Ecoregion		
OSPRI	Ocean State Policy Research Institute	TDA	Transboundary Diagnostic Analysis		
PC	Partnering country	UN	United Nations		
PCBs	Polychlorinated biphenyls	UNDP	United Nations Development Programme		
PEMSEA	Partnerships in Environmental Management for the Seas of East Asia	UNECE	Economic Commission for Europe		
PERSGA	Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden	UNEP	United Nations Environment Programme		
PFD	Programme Framework Document	UNEP GPA	UNEP Global Programme of Action for the Protection of Marine Environment from Land Based Activities		
PIC	Pacific Island Country	UNESCO	United Nations Educational, Scientific and Cultural Organization		
PNLG	PEMSEA Network of Local Governments	UNFCCC	United Nations Framework Convention on Climate Change		
POPs	Persistent organic pollutants	UNOPS	United Nations Office for Project Services		
POWP	LME Pacific Ocean Warm Pool Large Marine Ecosystem	UNWTO	World Tourism Organization		
RAC-SPA	Regional Activity Centre for Specially Protected Areas	USAID	United States Agency for International Development		
RCU	Regional Coordination Unit	WB	World Bank		
REMPEC	Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea	WCPFC	Western and Central Pacific Fisheries Commission		
RIEMP	Regional Integrated Environmental Monitoring Programme	WCPO	Western and Central Pacific Ocean		
RIIGLO	Information Exchange Network of Local Governments of the Rio de la Plata	WECAFC	Western Central Atlantic Fishery Commission		
		WIO	Western Indian Ocean		
		WIOMSA	Western Indian Ocean Marine Science Association		
		WMU	World Maritime University		
		WPEA	OFM West Pacific East Asia Oceanic Fisheries Management		



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