

An aerial photograph of a tropical archipelago, likely in Southeast Asia. The image shows numerous limestone karsts of varying sizes scattered across a body of water. In the foreground, a coastal village with colorful roofs is built on a small island. The water transitions from a clear blue to a greenish-brown near the shore. The sky is a pale blue with light clouds.

# From Ridge to Reef

**WATER, ENVIRONMENT, AND COMMUNITY SECURITY**  
GEF ACTION ON TRANSBOUNDARY WATER RESOURCES



**GLOBAL ENVIRONMENT FACILITY**  
INVESTING IN OUR PLANET



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## FOREWORD: SECURING OUR WATERS AND OCEANS IN TIMES OF GLOBAL CHANGE



**Monique Barbut**  
CEO and Chairperson

Water is at the heart of our planet's natural resource base. We need water to produce food, power industry, quench thirst, and nurture ecosystems. For too long water systems have been taken for granted, but times are changing.

We are living in a period of rapid global change that is putting our water resources at serious risk. Global financial and trade pressures, population increases and migration, and a warming planet are worsening an already critical situation. These multiple problems cannot be addressed in isolation through piecemeal programmes that have limited impact. Instead, they must be solved in an integrated manner, through effective and adaptive institutions.

For nearly two decades the GEF International Waters programme has helped countries work together to secure a wide range of economic, political, and environmental benefits from shared surface water, groundwater, and marine systems. Through its programming the GEF has played a catalytic role in helping 172 countries work together on shared water systems by leveraging \$1.1 billion in GEF grants and \$4 billion in cofinancing. Today, the GEF remains the world's largest financier of transboundary water collaboration.

In this publication you will find many examples of the powerful impact that cooperation on water can have on the political landscape. Before the Danube River Convention was signed, the GEF was working in the river basin with the United Nations Development

Programme, and continued to provide assistance during a period of armed conflict. As part of the Middle East Peace Accords the GEF and the World Bank supported Jordan as it undertook land-use reforms with its neighbors to protect the sensitive shared coral reefs in the Gulf of Aqaba.

In the Nile Basin the GEF has been the largest contributor, with \$79 million in grants to improve conditions for peace, security, and stability through eight innovative and cross-boundary water projects. The GEF is also facilitating cooperation in the South China Sea, the Orange River Basin, the Okavango River Basin, the Kura-Aras Basin, and the Sistan Basin shared by Afghanistan and Iran. Time and time again these initiatives have proven to be an important first step in supporting dialogue and cooperation where there were once disputes and conflict.

The importance of GEF support for water-related institutional development is clear, not only in terms of action at the multicountry political level, but also at the community level. Balancing competing uses of water, fisheries, oceans, and habitat improves local food security, livelihoods, water protection, and human health for the world's most vulnerable people. Still, the full potential of the GEF International Waters focal area has yet to be reached.

During these times of global change, achieving sustainability will depend on fostering trust among governments, building good working relations among ministries, and establishing institutions capable of undertaking adaptive

management at different scales. The GEF International Waters focal area is helping to build this needed trust in these harsh economic times through its integrated programming approach designed to address the linked issues of water, land, and climate change — perhaps the most daunting challenge of our time.

Our coasts and oceans have become degraded almost to the point of no return with the depletion of oceanic fish stocks, creation of coastal “dead zones” from pollution, and loss of coastal habitat. These large water systems cover most of our planet but, if we continue to manage them in a national and fragmented way, this will endanger the food supply and livelihoods for billions of people.

The world does not need a new set of adaptation programmes operating in a

vacuum through competing organizations to address sea-level rise, coastal storm vulnerability, drought, or floods. What is needed is to integrate these newly recognized stresses into the work of institutions focused on integrated water resources management (IWRM) or integrated coastal management (ICM), proven approaches that balance multiple demands on water and marine resources in a participative and adaptive manner.

The GEF as a unique, networked institution is poised to deliver this integrated approach to address climatic variability in concert with existing interventions supported under our International Waters programme. We stand ready with our network of public and private sector stakeholders to support countries as they work collectively with their neighbors to sustain shared freshwater and marine resources for a secure and stable economic future.





# INTRODUCTION

The world's oceans, rivers, lakes, and groundwater systems do not respect political borders. These large water systems cover most of our planet, but they continue to be managed in a national and fragmented way that is endangering the food supply and livelihoods of billions of people. If our nations continue to exploit these shared resources in unsustainable ways, we face a dismal future characterized by the depletion of our water and marine resources, increased poverty, and greater conflict.

Diversions of water for irrigation, bulk supply, and potable use, together with the pollution of our common water bodies are creating cross-border tensions. These tensions also persist across the oceans, with three-quarters of fish stocks being overfished, fished at their maximum, or in a depleted state. The GEF International Waters focal area was established to help countries work together to overcome these tensions in large water systems. The focal area helps countries collectively manage their transboundary surface water basins, groundwater basins, and coastal and marine systems in order to share the benefits from them.

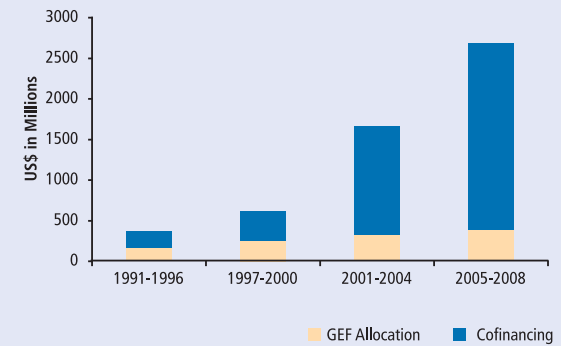
Since its establishment in the early 1990s, the GEF has pioneered processes to help countries build their trust and confidence in working together. As a result, 149 GEF recipient countries have sought and received funding to work alongside 23 nonrecipient countries to improve regional collaboration and share benefits from their particular transboundary water systems. Over this

period the GEF has allocated \$1.1 billion in grants with over \$4 billion in cofinancing for 183 projects in its International Waters focal area. The accompanying figures display the distribution of International Waters projects across regions and the cofinancing patterns that have been achieved.

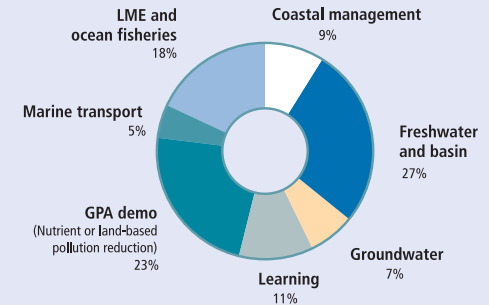
The GEF is the largest financial institution with the mandate, ability, and experience to address current and future challenges to shared freshwater and marine systems. Because of their transboundary nature these multicountry waterbodies and marine systems represent international public goods. They provide national water security, national food security, regional conflict mitigation, and the protection of important international ecosystems. Collective, multicountry cooperation toward a shared vision of action is necessary to continue sustaining the many benefits from these complex water systems.

In this publication we explore just a handful of the GEF International Waters projects that have already enabled countries to work collectively and, in many cases, to establish adaptive management institutions. The GEF works with 10 agencies as development partners to assist countries in undertaking their projects (see inside back cover). With the help of these agencies, the GEF has now supported regional collaborative efforts for 22 transboundary surface water basins, 16 large marine ecosystems, and 5 cross-border groundwater systems. The development of 13 new regional treaties, protocols, and regional agreements during these GEF projects

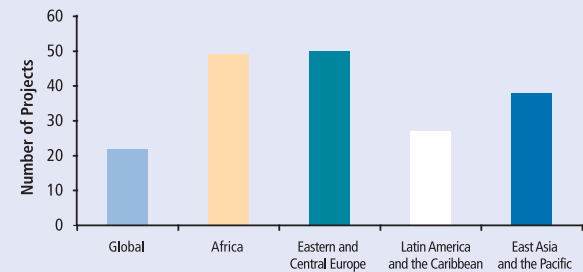
DEVELOPMENT OF GEF INTERNATIONAL WATERS FUNDS



NUMBER OF GEF INTERNATIONAL WATERS PROJECTS 1992 – 2008



REGIONAL DISTRIBUTION OF GEF INTERNATIONAL WATERS PROJECTS 1992 – 2008



highlights that many countries view the sustainability of these systems as critical to their future development.

An integral part of these regional projects has been the support of local demonstration projects to clearly show how communities can balance the competing uses of their water systems and share their living resources. In this way, the GEF has helped many countries with technology transfer and the adoption of more integrated management approaches. The GEF's catalytic activities help to promote greater collaboration between countries, between national ministries, and even between local communities.

The worsening condition of the world's rivers, groundwater, and coastal systems is increasing security concerns and restricting the potential for sustainable development. As always, the poor are first to suffer when there is not enough clean drinking water, enough water to grow food, or sufficient river flows for hydropower or environmental needs. Unwise development has already converted one-half of the global stock of coastal mangrove wetlands. Three-quarters of coral reefs have become degraded, with one-fifth already dead. At the present rate of degradation most reefs will be gone in 50 years, along with livelihoods for half a billion people. Cross-border cooperation will become even more essential for addressing tomorrow's challenges.

For countries that want to make commitments on joint action for a shared water system, the GEF helps fund regional collaboration as well as agreed incremental costs of national sector reforms and investments to address the particular transboundary concerns and opportunities they have identified. These actions help improve the food, water, and health security of communities, and sustain goods and services from the water and related land environment. They also promote regional integration, regional economic development, and regional stability among cooperating states. The need to balance the competing and conflicting uses of water resources and their living resources lies at the heart of the GEF's support for integrated water resources management (IWRM) in basins and aquifers and integrated coastal management (ICM) for coasts and Large Marine Ecosystems (LMEs).

This publication begins with the theme of promoting regional security in important transboundary basins such as the Danube and the Nile. Working closely with countries to enhance the security of water resources, environments, and communities is a constant theme that you will find in many of the GEF International Waters projects described in the following pages.





## Key Results

The GEF International Waters focal area has provided \$1.1 billion in grants and leveraged \$4.2 billion in cofinancing in support of 183 projects.

The GEF is the largest funding mechanism for multicountry collaboration on water and oceans with 149 GEF recipient countries and 23 nonrecipient countries working together to manage their transboundary water resources.

REGIONAL COLLABORATION HAS BEEN ACHIEVED IN	
22	Transboundary river basins
8	Transboundary lake basins
5	Transboundary groundwater systems
19	Large Marine Ecosystems

In the last four years the cofinancing ratio for the GEF International Waters projects has increased two-fold over the previous four years as countries begin requesting investments for implementing their shared action programmes.

Countries participating in GEF International Waters projects have negotiated 13 regional cooperation frameworks, treaties, or protocols while receiving GEF funding.

Through the Danube/Black Sea Basin Partnership for Nutrient Reduction the GEF and the World Bank are cooperating to fund 10 national nutrient reduction projects in the agriculture, municipal sewage, industrial, and floodplain management areas to address the emerging global problem of nitrogen pollution and coastal “dead zones.”

At the request of countries the GEF has replicated the Partnership Investment Fund concept for three new marine waters approved by the GEF Council: the Mediterranean Sea Large Marine Ecosystem (LME); Nutrient Reduction for the East Asian Seas LMEs; and Sustainable Fisheries for the LMEs of Sub-Saharan Africa.



A nighttime aerial photograph of Pittsburgh, Pennsylvania. The Allegheny River flows through the center of the image, with several bridges crossing it. In the foreground, the Suspension Bridge is illuminated with warm lights. To the right, the Cathedral of Learning is brightly lit, showing its distinctive dome and spires. The city lights of Pittsburgh are visible in the background, with hills in the distance under a dark blue sky.

# Promoting Regional Security





**T**HE INCOMES AND LIVELIHOODS OF BILLIONS OF PEOPLE DEPEND ON TRANSBOUNDARY BASINS AND AQUIFERS. THESE SHARED WATER SYSTEMS HOLD THE POTENTIAL TO BE A SOURCE OF CONFLICT OR A CATALYST FOR REGIONAL COOPERATION, SOCIOECONOMIC DEVELOPMENT, SECURITY, AND PEACE.

BY 2025 TWO-THIRDS OF THE WORLD'S PROJECTED POPULATION OF 8 BILLION WILL LIVE IN COUNTRIES THAT SUFFER SEVERE OR MODERATE WATER STRESS, MAKING WATER A POTENT SOURCE OF FUTURE CONFLICTS. EXPERTS NOW LIST SOME 300 AREAS OF POTENTIAL CONFLICT OVER WATER SHARING.

OVER THE PAST 15 YEARS THE GEF HAS SUPPORTED 149 GEF RECIPIENT COUNTRIES AND 23 NONRECIPIENT COUNTRIES THROUGH 183 PROJECTS DESIGNED TO PROMOTE THE COOPERATIVE MANAGEMENT AND DEVELOPMENT OF SHARED WATERS AND BASINS. THESE PROJECTS HAVE HELPED NATIONS TO INCREASE FOOD SECURITY, REDUCE POVERTY, AND STEM THE TIDE OF MIGRATION TO ALREADY OVERPOPULATED URBAN AREAS.

STARTING IN THE MID-1990s GEF-FUNDED PROJECTS IN THE DANUBE RIVER BASIN FACILITATED GREATER DIALOGUE AND TECHNICAL COOPERATION AMONG BALKAN COUNTRIES THAT HAD RECENTLY BEEN AT WAR. TOGETHER WITH ITS DEVELOPMENT PARTNERS THE GEF HAS SUPPORTED A RANGE OF PROGRAMMES, LIKE THE "NILE BASIN INITIATIVE," WHICH HAVE HELPED TO FOSTER COOPERATION, BUILD TRUST AND PROMOTE GREATER SECURITY ACROSS ENTIRE REGIONS.

# THE DANUBE RIVER BASIN: A GLOBAL SUCCESS STORY FOR INTEGRATED WATER RESOURCE MANAGEMENT



The Danube River Basin, which is shared by 19 countries, is now admired around the world as a model for integrated water resource management (IWRM). Before the massive political changes that transformed Europe in the late 1980s, these countries had experienced little collaboration to address their shared environmental concerns.

Over the past 150 years the Danube Basin has sustained significant environmental damage, including the loss of 80 percent of its wetlands and floodplains. In the 1970s and 1980s, growing levels of nutrient pollution from wastewater and agricultural activities also had a severe impact on the health of the Danube and the Black Sea.

Since 1991 the GEF has been a catalyst for promoting increased cooperation among Danube basin countries formerly divided during the Cold War. In 1991 Germany and Austria were the only Danube countries that were members of the European Union. Today the Czech Republic, the Slovak Republic, Slovenia, Hungary, Romania, and Bulgaria have all joined the EU and Croatia is an accession country.

Over 15 years the investment by the GEF International Waters Programme has helped the Danube countries to build scientific knowledge, strengthen regional governance institutions, and promote public understanding and participation in activities to protect their shared environment. German Environment Minister Sigmar Gabriel believes that support provided by the GEF played a significant role in strengthening both the environment and the political stability of the entire Danube region.

“When the GEF started its work in 1991 the Danube was severely polluted, but with the fall of the Iron Curtain, the political will for a basin-wide cooperation was increasing. The GEF project not only turned the Danube into a classic example of integrated river basin management, but it also backed up the political stability of the whole Danube region,” he says.

Now in the Danube Basin there are signs of environmental improvement, and all Danube countries are on track to meet the requirements of the EU Water Framework Directive. The results have been extraordinary. In the Danube Basin nitrogen emissions have decreased by 20 percent and phosphorus almost by 50 percent over the last 15 years. Oxygen depletion in the lower levels of the Black Sea has been virtually eliminated, with oxygen levels now at or near saturation in most areas.

After the collapse of the former Soviet Union the driving force for environmental change in the Danube Basin was provided by the promise of accession to the European Union and the subsequent need to meet its stringent environmental directives. Over a 15-year period, from 1991 to 2007, it was the support provided by the GEF/UNDP that prepared countries for the challenge of building a successful IWRM framework in the Danube Basin. During this period the GEF/UNDP provided countries with significant assistance in helping to build their capacity to continually meet the EU's accession and legislative challenges.

In 1998 the International Commission for the Protection of the Danube River (ICPDR) was established as the main implementing body

Strengthening the Implementation Capacities for Nutrient Reduction and Transboundary Cooperation in the Danube River Basin

Agency  
UNDP

GEF grant  
17.6 million

Co-financing  
19.5 million

Countries  
Bulgaria, Croatia, Czech Rep.,  
Hungary, Moldova, Romania,  
Slovakia Rep, Slovenia, Ukraine,  
Yugoslavia & Serbia

Website  
<http://www.undp-drp.org/drp>



## PROMOTING COOPERATION IN THE SAVA RIVER BASIN

The Sava River Basin covers areas in the five countries of Slovenia, Croatia, Bosnia and Herzegovina, Montenegro, and Serbia. The Sava River is the third longest tributary of the Danube and it has the second largest catchment area in the Danube Basin.

By helping to gain the trust of former Yugoslav experts and officials, the GEF was instrumental in developing a working framework for the new Sava Commission, which was established in 2006. The 2004 Sava Framework Agreement was a key result of the Stability Pact for southeastern Europe, which helped to strengthen efforts to foster peace and economic cooperation among these countries.

The UNDP–GEF Danube Regional Project (DRP) assisted the Sava River Basin Commission in the development of a management plan for the basin. Although only Slovenia, as an EU member state, and Croatia as an accession country, were required to do this by the EU Water Framework Directive (WFD), Bosnia and Herzegovina, Serbia, and Montenegro also agreed to comply voluntarily.

The Sava Commission continues to benefit from the ongoing experience and assistance provided by the International Commission for the Protection of the Danube River (ICPDR) and the GEF project. Because of assistance from the DRP and other international projects the Sava Basin is now viewed as a pilot region for the implementation of the WFD in Europe.

of the Danube Convention. Since its creation, the ICPDR has grown into one of the largest and most active international bodies of experts on IWRM in the world, promoting policy agreements and setting joint priorities and strategies to improve the basin. This permanent, financially sustainable body is now vital to maintaining continuity, momentum, and country commitment to IWRM.

After 2000 its main priority was the implementation of the EU Water Framework Directive (WFD), which obliges EU member states and accession countries to use a river basin approach for managing their water resources. Now that even nonaccession countries have agreed to abide by the Water Framework Directive, effectively all Danube countries are guided by one common overarching regional water-related legal framework.

The WFD requires cross-border cooperation and encourages multistakeholder cooperation,

including the involvement of NGOs and local citizens. It also obliges every EU river basin, including the Danube, to develop a “River Basin Analysis,” followed by a “River Basin Management Plan (RBMP)” that specifies the actions required to meet its 2015 objectives.

From 2001 to 2007 the main goal of the GEF-funded Danube Regional Project was to strengthen the capacity of the ICPDR and Danube countries to cooperate in fulfilling their commitments to implement the Danube Convention and EU WFD. Reducing nutrient pollution was especially important given the priority of addressing downstream eutrophication problems in the Black Sea.

Raising awareness about Danube issues and encouraging public participation in environmental decision making have been key features of building IWRM in the basin. The Danube Environmental Forum (DEF),

initially developed with support from GEF/UNDP, is the umbrella organization for the largest network of NGOs in the basin. It consists of 174 member organizations and national focal points from 13 Danube countries. The Danube Regional Project helped strengthen the DEF even further by extending the network and providing training and support for public awareness-raising activities.

The Danube Small Grants Programme was the first time the GEF had worked with NGOs in this way. Nearly 150 small grants were distributed to NGOs in 11 countries, and many projects were geared to solving nutrient reduction. About half of all of the Small Grants went to NGOs supporting activities to promote best agricultural practices. International Danube Day was launched by the ICPDR on 29 June 2004 and it is now celebrated every year through a diverse range of activities designed to help mobilize people in support of the basin and its unique biodiversity.

In 2007 the ICPDR won the International Theiss River Prize for excellence in water management in the Danube River Basin. One of the most highly regarded international water management awards, the Theiss River Prize identifies the world's best practices in water management, preservation, and restoration.

Today, the multicountry cooperation and coordination reached through the ICPDR is a great success for the most international river basin in the world. Ultimately, GEF/UNDP efforts in the Danube–Black Sea area could become a progressive model for expanding public awareness of the need to embrace IWRM as a way to ensure that our economies can grow without renewed environmental destruction.

## SUPPORTING WATER SECURITY IN THE NILE BASIN

From its upper reaches in Rwanda, Burundi, and Ethiopia to its delta in Egypt, the Nile River Basin unites 10 countries and carries precious water to irrigate crops, generate power, and nourish communities. The basin is home to some 160 million people, most of whom still live in rural areas and depend

directly on land and water resources for shelter, income and energy.

Six of the Nile Basin countries are among the poorest in the world and, according to FAO figures, more than 40 percent of their people are undernourished. Increasing water

shortages pose the greatest threat to food security throughout the region. Population growth, unsustainable resource use, and the impacts of climatic variability have all served to heighten regional tensions regarding competition for limited water resources. Greater instability and civil unrest will continue to threaten the entire region unless the Nile countries can find an effective way to reform the governance of the basin and their shared water resources.



In the late 1990s, with the help of the GEF and other development partners, the Nile countries took a bold step to work together to develop a shared vision for the sustainable development of the basin and its water resources. In July 2001 the Nile Basin countries cooperated in launching the International Consortium for Cooperation on the Nile and received pledges from the donor community for an initial \$140 million for the Shared Vision Programme of their Nile Basin Initiative with an anticipated \$3 billion in additional investments for sustainable water development.

The Nile Basin Initiative was designed to build trust by fostering cooperation between countries to protect the quality of the Nile waters and promote sustainable development within its basin. The GEF International Waters focal area played a critical role at the very start

Nile Transboundary Environmental Action Project  
(NTEAP)

Agency  
UNDP, World Bank

GEF grant  
23.5 million

Co-financing  
162.8 million

Countries  
Burundi, Congo DR, Egypt,  
Eritrea, Ethiopia, Kenya, Rwanda,  
Sudan, Tanzania

Website  
<http://www.nilebasin.org/>

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of this initiative by supporting the cooperation and collaboration required for Nile countries to understand and manage their transboundary water environment.

With assistance from UNDP and the World Bank, countries worked together to undertake the joint fact finding needed to produce a transboundary environmental analysis. This process helped countries to build greater confidence and trust in working together and in setting priorities for further action.

The regional analysis was produced through a participatory process that included in-country consultations, interministerial coordination, and the production of national reports. Consultation was undertaken at both the national and regional levels among a broad spectrum of stakeholders, including experts, policy makers, and civil society. The transparent sharing of data and increased stakeholder

participation helped countries to take a pragmatic first step toward achieving the shared visions adopted by their governments.

The GEF Transboundary Environmental Analysis was the first joint undertaking approved by the Nile Council of Ministers in March 2001. The analysis also supported the adoption of actions included in the Nile River Transboundary Environment Action Project (NTEAP).

Project activities include capacity building, knowledge and information sharing, environmental education and awareness raising, environmental monitoring, and field activities at selected pilot sites. By promoting this regional cooperation the project has helped to build much needed trust and confidence among nations to ensure there is equity in future decisions on their shared water resources.



## SUPPORTING COMMUNITY PARTICIPATION IN THE NILE BASIN

Through its Small Grants Programme the Nile River Transboundary Environment Action Project (NTEAP) has committed more than \$4 million to almost 200 microgrants supporting a range of community-based activities to save water, protect the environment, and improve food production. The level of support for the Nile Programme was underscored when the President of Burundi attended the initiation of one of his country's first microgrant projects.

The use of demonstration projects and the provision of training for approximately 20,000 people in the use of proven technology has helped to improve crop yields and improve food security. These activities have also led to more than 100,000 people now having access to a safe and continuous water supply. Six million trees were planted as just one of several measures to reduce soil erosion and, ultimately, the Small Grants Programme has already led to the conservation of more than 95 million cubic meters of water. The experiences and lessons learned through the wealth of microgrants projects are being shared through regional forums across the Nile Basin communities.

The Nile Small Grants Programme has also supported broader participation in the decision-making process. The first countries to approve projects were those which had sound institutional structures in place. National steering committees provided national ownership to the programmes and assisted in formulating strategies, action plans, and project proposals. Despite progress still greater political will is needed to adopt the regional cooperative framework for scaling up and replicating these local successes across the Nile Basin.



A scenic view of a river with a dam in the background and a boat in the foreground. The dam is a long, low structure with water cascading over it, creating a white, frothy spray. The river is calm and reflects the sky. In the foreground, a dark, narrow boat is visible, partially submerged. The background is filled with lush green trees and vegetation. A small teal square is visible in the top right corner.

# River Basins — Collaborating Across Borders





IT IS HARDLY SURPRISING THAT SO MANY RIVERS IN DEVELOPING COUNTRIES ARE RUNNING DRY WHEN MORE THAN 85 PERCENT OF WATER IS BEING USED FOR IRRIGATION. FOOD SECURITY AND THE RACE TO GENERATE FOREIGN EXCHANGE FROM AGRICULTURE FREQUENTLY REPRESENT A POLITICAL IMPERATIVE THAT OUTWEIGHS THE ENVIRONMENTAL AND HEALTH CONCERNS OF MANY DOWNSTREAM COMMUNITIES.

BY TAKING AN INTEGRATED WATER RESOURCE MANAGEMENT (IWRM) APPROACH, GEF INTERNATIONAL WATERS PROJECTS ARE DESIGNED TO BRING STAKEHOLDERS TOGETHER TO BALANCE COMPETING WATER USES AND SECURE LOCAL BENEFITS FOR THEIR COMMUNITIES. WHETHER IT IS THE NILE RIVER BASIN, OR THE MARINE SYSTEM OF THE SOUTH CHINA SEA, GEF PROJECTS ARE HELPING GOVERNMENTS TO WORK TOGETHER ON THESE IMPORTANT REGIONAL ISSUES.

AS NATIONAL ECONOMIES DEVELOP, RIVER BASIN WATER RESOURCES ARE PROGRESSIVELY DIVERTED, CHANNELED, DAMMED, AND CONSUMED. THIS CREATES CONFLICTS OVER WATER USES WITHIN COUNTRIES AND DIMINISHES POTENTIAL USES IN DOWNSTREAM COUNTRIES. DRASTIC CHANGES ARE NEEDED IN HOW WE VIEW SUCH WATER SYSTEMS. WE NEED MORE INTEGRATED APPROACHES THAT WORK ACROSS SECTORS TO RESPECT THE MULTIPLE USES OF WATER, CATCHMENTS, AND FLOODPLAINS. THESE APPROACHES NEED TO INCLUDE REDUCTION OF WATER POLLUTION FROM TOXIC SUBSTANCES THAT IMPAIR HUMAN AND ECOSYSTEM HEALTH.

THROUGH A \$1.1 BILLION PORTFOLIO THAT INCLUDES MORE THAN 50 PROJECTS, THE GEF AND ITS PARTNERS ARE ASSISTING COUNTRIES ON FOUR CONTINENTS TO IMPROVE THEIR UNDERSTANDING AND SHARED MANAGEMENT OF 30 LAKE AND RIVER BASINS. THIS APPROACH INCLUDES LEGAL, POLICY, AND INSTITUTIONAL REFORMS TO ADDRESS PRIORITY THREATS, SUPPORT REGIONAL INSTITUTIONAL DEVELOPMENT, PROVIDE TECHNICAL ASSISTANCE AND INVESTMENTS, AND OFFER A FORUM FOR NATIONS TO DISCUSS AND RESOLVE CONFLICTING VIEWS IN A TRANSPARENT MANNER.

## STRENGTHENING MANAGEMENT INSTITUTIONS FOR THE LAKE VICTORIA BASIN

Lake Victoria, the largest of all African lakes, occupies a wide depression between the East and West Great Rift Valleys. The Lake Victoria Environmental Management Project, which is implemented jointly by the riparian countries of Kenya, Tanzania, and Uganda, has taken huge strides in improving the regional management of this vital resource.

During the 15 years that the GEF has provided support in Lake Victoria, two transboundary water institutions have been established by legal frameworks. The Lake Victoria Fisheries Organization was established through a convention signed in 1994 by the East African Community States of Kenya, Tanzania, and Uganda. The Lake Victoria Basin Commission was established in 2003 by the Protocol for Sustainable Development of Lake Victoria Basin enacted under the 1999 Treaty for the Establishment of the East African Community.

The Ugandan Minister for Environment and Water, the Hon. Maria Mutagamba, believes the GEF project has played a critical role in

supporting the development of the Lake Victoria Commission and the Lake Victoria Fisheries Organization as critical management mechanisms that now serve the three countries.

“The Commission provides a regional institutional arrangement for the management of Lake Victoria. It provides a cooperative framework for the collaborating countries and institutions to sustainably manage Lake Victoria and its respective catchment,” she says.

These developments have been critical in a region with high population growth and the potential for conflicts among multiple activities within the lake basin. In the last three decades the lake ecosystem has come under increasing pressure from nutrient pollution and the occurrence of massive algal blooms. Many of the lakes’ problems have been attributed to the introduction of the Nile Perch and the water hyacinth which, beginning in 1989, began to choke important waterways and landings, especially in Uganda. Overfishing and

oxygen depletion also threaten fisheries and biodiversity, with more than 200 indigenous species said to be facing possible extinction.

Although efforts to promote greater collaboration on fisheries management date back as far as 1928, these efforts never managed to achieve a strong intergovernmental harmonization among the riparian countries. Through the support of the Lake Victoria Basin Management Project countries were able to work together to design and initiate the Lake Victoria Fisheries Organization. This new organization will help ensure that fisheries resources are managed within a regional framework that enables decisions to be made in reference to the wider lake environment.

Minister Mutagamba believes the Lake Victoria Environmental Management Project played a critical role in helping the three riparian states to build the knowledge required to improve management of the lake and its resources.

“One of the most significant benefits was the establishment of a comprehensive regional water quality monitoring network of Lake Victoria comprising of 19 stations on the lake. This network, for the first time, enabled the

*Minister Mutagamba believes the Lake Victoria Environmental Management Project played a critical role in helping the three riparian states to build the knowledge required to improve management of the lake and its resources.*

Lake Victoria Environmental Management Project  
(LVEMPI & II)

Agency  
World Bank

GEF grant  
43.8 million

Co-financing  
150.4 million

Countries  
Burundi, Kenya, Rwanda,  
Tanzania, Uganda

Website  
<http://www.nilebasin.org/>



regional scientists to characterize the lake dynamics and pollution levels. Further still, identification of the sources of pollution and elements leading to deterioration of ecosystem were identified," she says.

Through the preparation of National Environmental Action Plans the three countries quickly realized the need to develop a regional management framework to secure the future viability of the lake. This led to the countries signing a tripartite agreement to work together toward preparation and implementation of a regional environmental programme.

Minister Mutagamba says the project has helped countries to test innovations and harmonize their national water and environmental legislation. She says the project outputs will now be used in a review of national policy to: "guide Uganda to engage in regional initiatives and developments in a cooperative manner and derive maximum benefits without significant harm to her neighbors."

The next stage of the Lake Victoria Environmental Management Project starting in 2009 includes Rwanda and Burundi, the two countries that are part of the upper catchment that drains into the lake through the Kagera River. By including these two countries it is envisioned that a more holistic solution can be formulated in the regional efforts to target the water hyacinth and pollution.



## A RIVER WATER CHARTER FOR THE SÉNÉGAL BASIN

The call for integrated approaches toward management of the Senegal River Basin in West Africa dates back to the early 1970s when Mali, Mauritania, and Senegal agreed to create the river basin organization, L'Organisation pour la Mise en Valeur du Fleuve Sénégal (OMVS). Despite the formation of this organization conflicts over water uses persisted and Guinea, the country that provides most of the basin water, was still not part of the agreement.

With support from the GEF, countries around the Senegal River Basin decided to integrate environmental and other use considerations into basin-wide water management. In 1999 all four countries approached the GEF, through UNDP and

the World Bank, for an International Waters project on their shared basin and received a \$7.25 million GEF grant accompanied by \$14 million in cofinancing to launch a basin-wide cooperation programme. This programme helped to integrate the management of land and water resources and provided a coherent legal framework for the environmentally sustainable management of the river basin.

In 2002 the countries signed the Senegal River Water Charter, which establishes principles for guiding water resources management and allocation among the states in an integrated manner. Water is not allocated to

riparian states in terms of volume but is withdrawn according to possible functions. The various uses can be for: agriculture; inland fishing; livestock; fish farming; tree farming; fauna and flora; hydroelectric energy production; urban and rural drinking water supply; health; industry; navigation; and the environment. Additionally, the country of Guinea joined the OMVS, with the four heads of state signing the new treaty in 2006. Each country's national legal framework was harmonized with the basin framework, and a new \$110 million regional water resources cooperation effort has now been funded by the World Bank's International Development Association (IDA) programme.



## BEACH MANAGEMENT UNITS SUPPORT COMMUNITY-BASED MANAGEMENT IN LAKE VICTORIA

The Lake Victoria Fisheries Organization is supporting the formation of networks that link Beach Management Units to governments and other stakeholders at all levels as part of fisheries comanagement. Beach Management Units are key community-based organizations and everyone working in fisheries at a beach must be registered with a unit. They must have at least 30 boats, and a committee with representatives from all stakeholder groups, so that they are big enough to plan, raise revenue, and operate effectively.

In Uganda the project initially funded 51 Beach Management Units, but this was quickly replicated to 350 with funding from other sources. Across Kenya, Tanzania, and Uganda a total of 1,157 units are now active. The bottom-up approach has been successful in bringing fisheries management closer to the daily users of the lake resources. Local communities are directly involved in revenue collection and activities to curb the use of illegal fishing equipment. By improving local management the beach units have also helped to feed into and strengthen fisheries governance at a national level.

## NEW TECHNOLOGIES FOR SAVING WATER IN CHINA'S HAI RIVER BASIN

The Hai River Basin is critical for China because it drains the capital, Beijing, and flows to the large city of Tianjin and then on to the Bohai Sea. People in the basin suffer severe water problems caused by overexploitation of the river and groundwater, but they also contribute to excessive pollution of the sea.

A GEF/World Bank project designed to introduce integrated water resources management to the basin provided \$17 million in GEF funding together with \$113 million in cofinancing (including World Bank loans). The project is helping to bring different ministries together to work on water problems at the county level for the first time.

The project is supporting practical demonstration measures such as low-cost sewage treatment options for cities of 250,000 people. It is also testing widespread use of remote sensing technology from satellites and new water-saving techniques based on reducing the evapotranspiration from irrigated cropland. Water allocations, well permits, water rights, and irrigation scheduling are based on the evapotranspiration from the crops (or their actual water needs.) All these innovations are supported and shared by farmers through active water user associations.

Based on initial trials in the Tarim River Basin the potential exists for saving almost 20 percent of the water used in irrigation. By scaling up water and irrigation reforms of this kind the Government of China could balance conflicting water uses in the North China Plain and in the shared marine waters downstream.





## CREDIT FACILITY HELPS REDUCE TOXIC POLLUTANTS IN SLOVENIA

Reducing the discharge of toxic substances is an essential element of river basin management. In Slovenia an innovative environmental credit facility is helping to reduce the discharges of nutrients and toxic substances into the Danube River Basin. Access to environmental funding is crucial for Slovenia to meet EU standards, and the facility is designed to support industrial companies, livestock farms, and small municipalities that are planning to undertake investments to reduce water pollutants.

The GEF has undertaken a number of pilot projects to demonstrate the transfer of technology through direct payment, cost-sharing incentives, and innovative financing. In Slovenia the GEF worked with the EBRD (European Bank for Reconstruction and Development) to test the use of financial intermediaries in lending to small and medium enterprises. The \$57.8 million framework credit facility is channeled through local banks to provide loans to private sector companies and smaller municipalities for

investment projects to reduce water pollution. Projects financed through the facility include the recycling of cooling waters at a glass production company, the upgrading of wastewater treatment at a textile company and the re-use of wastewaters at a pulp and paper mill.

Loans from the EBRD are combined with \$9 million of GEF investment grant funds that are used to provide financial incentives for companies and municipalities to borrow. The first participating bank signed up to the facility in December 2003, taking an initial credit line of \$7 million. Subsequently, 49 subprojects received subloans varying in size from Euro \$83,000 up to a maximum of Euro \$4.5 million.

So far 42 subprojects have been successfully completed, resulting in a significant reduction in toxic substances and other pollutants. Because of the success of this initiative, the GEF is now looking to replicate the Slovenian Environmental Credit Facility.

*This innovative credit facility provides loans through local banks to encourage companies and municipalities to invest in projects to reduce water pollution in the Danube.*



Environmental Credit Facility for Slovenia

Agency  
EBRD

GEF grant  
9.9 million

Co-financing  
48.9 million

Countries  
Slovenia

Website  
<http://www.ebrd.com/apply/tambas/news/060703.htm>

## THE GLOBAL MERCURY PROJECT PROMOTES CLEANER ARTISANAL GOLD MINING

Although artisanal and small-scale gold mining supports the livelihoods of 10-15 million people, it is also one of the major global sources of mercury contamination. These mining activities are frequently accompanied by extensive environmental degradation and deplorable socioeconomic and occupational health conditions.

As part of the Global Mercury Project, a partnership between GEF, UNDP, and UNIDO, demonstration activities were located in key transboundary river/lake basins in six countries: Brazil, Indonesia, Laos, Sudan, Tanzania,

and Zimbabwe. The project assisted these countries in assessing the extent of pollution from current mining activities. It then worked to introduce cleaner gold mining and extraction technologies that would minimize or eliminate the release of mercury into the environment.

The project has also developed regulatory mechanisms to enable the sector to minimize its negative impacts. This was accompanied by the development of national monitoring programmes and policies needed to support practical and workable standards for artisanal gold mining.





## HELPING INDIGENOUS PEOPLES OF THE RUSSIAN ARCTIC TO REDUCE TOXIC CONTAMINATION

Indigenous peoples in the Russian north rely largely on fishing, hunting, and herding for subsistence. An initial GEF/UNEP project found high levels of persistent toxic substances that can accumulate through the food chain, particularly in traditional food derived from marine mammals. The GEF's first \$750,000 project was designed to assist these indigenous peoples in developing appropriate actions to reduce health risks resulting from the contamination of their environment and traditional food sources.

A second \$5.5 million project was designed to establish a sustainable framework to reduce the environmental degradation of the Russian Arctic marine environment from land-based activities. This project enabled a range of capital investments to address the main root causes of transboundary pollution. One of several demonstration activities included a project to reduce pollution from a former military base that posed significant threats to the health of the indigenous peoples and their ecosystem.







A silhouette of a person carrying a water container on their head is walking from left to right across a grassy field. A large, dark tree stands on the right side of the frame. The background is a bright, hazy sky with a large sun in the upper left corner. The overall scene is captured in a low-angle, wide shot, emphasizing the vastness of the landscape.

# Managing Transboundary Groundwaters





**T**HE GEF IS WORKING TO SUPPORT A NUMBER OF TRANSBOUNDARY GROUNDWATER MANAGEMENT PROJECTS ACROSS FOUR CONTINENTS. AS A RESULT OF THESE PROJECTS, THE PARTICIPATING COUNTRIES ARE UTILIZING A WIDE VARIETY OF APPROACHES TO CONSERVE AND PROTECT THEIR SHARED GROUNDWATER SYSTEMS.

AROUND 96 PERCENT OF THE WORLD'S FRESHWATER RESOURCES ARE LOCATED IN AQUIFER SYSTEMS THAT ARE OUT OF SIGHT AND TOO OFTEN OUT OF MIND. GROWING POPULATIONS AND INTENSIVE IRRIGATION ARE ALREADY OUTSTRIPPING SURFACE WATER RESOURCES, AND MILLIONS OF PEOPLE ARE BEGINNING TO RELY ON THEIR SHARED AQUIFER SYSTEMS FOR DRINKING WATER. BUT MANY OF THESE FRAGILE WATER SUPPLIES ARE NOW UNDER THREAT FROM OVERUSE AND POLLUTION.

RECHARGE AREAS OF LAND ARE CRITICAL TO SUSTAINING AQUIFER SYSTEMS AND, JUST LIKE SURFACE WATER, GROUNDWATER SHOWS SCANT REGARD FOR POLITICAL BOUNDARIES. AROUND THE WORLD AT LEAST 250 TRANSBOUNDARY GROUNDWATER SYSTEMS HAVE BEEN IDENTIFIED, AND WE ARE NOW DIGGING DEEPER AND DEEPER INTO SOME SYSTEMS THAT HAVE TAKEN THOUSANDS OF YEARS TO FORM. THIS IS STARTING TO CAUSE INTENSE COMPETITION AMONG AGRICULTURAL, INDUSTRIAL, AND MUNICIPAL USERS. STRONGER MANAGEMENT AND WATER ALLOCATION SYSTEMS WILL BE NEEDED IN ORDER TO SUSTAIN THESE WATER SOURCES AND PROTECT THEM FROM OVERUSE AND DAMAGING POLLUTION.

THE CONJUNCTIVE MANAGEMENT OF SURFACE WATER AND GROUNDWATER RESOURCES IS HARDLY EVER PRACTICED BUT IT WILL SOON BE VITAL IN REGIONS WHERE DROUGHTS ARE LIKELY TO INTENSIFY WITH GLOBAL WARMING.

## IMPROVING THE MANAGEMENT OF SOUTH AMERICA'S GUARANI AQUIFER

As a result of a GEF/World Bank project, all four countries that share the Guarani aquifer (Argentina, Brazil, Paraguay, and Uruguay) have undertaken national reforms to improve the management of this precious groundwater resource. This project now serves as a model for how countries can collaborate on the management of their shared groundwater systems.

The Guarani is the largest aquifer in South America. In Brazil alone it extends over 1.2 million square kilometers — equal to the areas of England, France, and Spain combined. Groundwater can be found in the pores and fissures of sandstones at depths of 50-1500 meters at temperatures varying from 33°C to 65°C.

Although the system is shared by four countries, prior to the GEF project little attention was paid to groundwater, and no regional framework was in place to support the management of this important resource. In order to sustain the benefits they share from the aquifer, the four countries approached the GEF for support to better understand and manage this important water system.

Groundwater is especially valuable because it does not normally require chemical treatment, and the aquifer already supplies drinking

water to some 15 million people in the region, including around 500 cities and towns in Brazil. Best estimates show that the aquifer contains enough water to supply 360 million people on a sustainable basis, but water consumption on the continent is already rising rapidly. Parts of the Guarani have been overpumped, and pumping on the border between Argentina and Uruguay led to increased tension between the two countries. Sensitive recharge areas are also becoming threatened by agricultural chemicals.

In May 2003 all four aquifer states agreed to initiate a project called the Environmental Protection and Sustainable Development of the Guarani Aquifer System. The long-term objective of the project is to develop an integrated plan for the protection and sustainable management of the aquifer system.

The project has supported the four countries in the joint elaboration and implementation of a common institutional, legal, and technical framework for the management and preservation of the aquifer. Because groundwater protection demands cross-sector action, each country established national interministry committees. In Brazil interministry committees were even established in local states to ensure a more integrated management

approach by the many cities and towns that depend on this resource.

The project helped to enhance understanding of the Guarani aquifer system through the development of a transboundary diagnostic analysis and the implementation of a permanent monitoring system. The formulation of a Strategic Action Programme (SAP) resulted in establishment of a strategic, coordinated management framework, which will facilitate and support solutions to the current and emerging problems of pollution, overexploitation, and other stresses that may threaten the sustainable development of the aquifer.



Environmental Protection and Sustainable Development  
of the Guarani Aquifer System

Agency  
World Bank

GEF grant  
13.4 million

Co-financing  
13.3 million

Countries  
Argentina, Brazil, Paraguay,  
Uruguay

Website  
<http://www.sg-guarani.org>

*The Guarani aquifer provides a model of how countries can collaborate in the management of shared groundwater systems.*

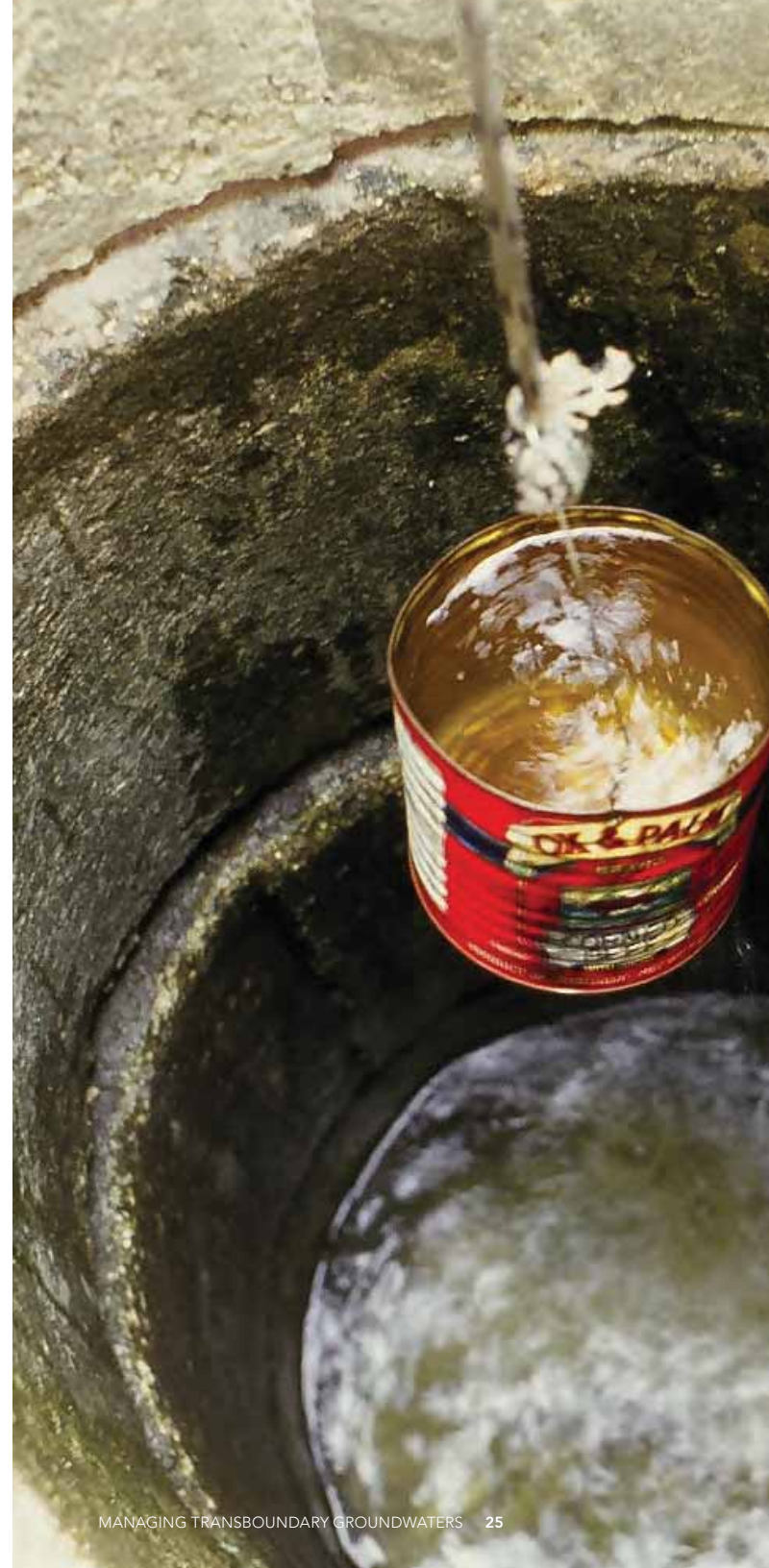
Four pilot demonstrations included measures to reduce pumping where conflicting uses existed, and to prevent the contamination of recharge areas from agricultural chemicals. The project also focused on efforts to build greater awareness among the wider public and indigenous communities. A “Citizen’s Fund” was developed to encourage community-based NGOs in their ongoing efforts to protect the groundwater system.

The conservation and protection of the groundwater supply have now been mainstreamed into both national and regional institutions to ensure that surface and groundwater are both addressed and the groundwater resource can be sustained during periods of drought. In order to sustain regional efforts to protect the aquifer, Brazil and Argentina have agreed to fund the Secretariat in Montevideo, Uruguay, to manage their joint action programme through a Regional Cooperation Council supported by national units. The first year’s budget of \$180,000 has been allocated for work starting in 2009 and is being sustained through the framework of the Plata Basin

Treaty. The set of tools and instruments developed by the project will be maintained and updated by these new commissions.

On the national level, the new Water Resources Law in Paraguay (2007) now includes groundwater, and Uruguay has established a national Guarani Management Unit. Brazil has integrated groundwater considerations into its National Water Resources Plan, with \$8.26 million allocated to support the implementation of its Surface and Groundwater Integrated Management Programme. In Argentina all six Guarani aquifer provinces are now represented on the Argentina Federal Water Resources Council.

At the local level, a number of actions have been taken as a result of specific concerns identified by the project. For example, the Water Management Committee for Paraguay’s Capibary Watershed is working to remove potential hazards from soybean plantations. In Uruguay funds have been invested in wastewater treatment systems in an effort to avoid local contamination of the aquifer.



## PROTECTING THE BASSETERRE VALLEY AQUIFER IN ST. KITTS AND NEVIS



The aquifer underlying the Basseterre Valley is a significant economic and social asset for the people of St. Kitts & Nevis. The hills that surround this small valley create the basin which forms the aquifer. The valley is approximately 21 square kilometers in area and widens to the southeast as it empties into the Caribbean Sea at Basseterre, the capital of St. Kitts. The aquifer produces about 2.5 million gallons of water a day, about 60 percent of the capital's water supply, but it is also becoming highly vulnerable to contamination.

For many years sugar cane cultivation dominated the recharge area, but residential and commercial development is rapidly expanding up the valley. Increased levels of nitrates and other pollutants have been found in water samples taken from the area, and the prevention of further contamination is critical. Once the aquifer is contaminated beyond acceptable levels it will be economically and scientifically impossible to restore the integrity of this important underground water resource.

A GEF demonstration project in the Basseterre Valley is part of the Integrating Watershed and Coastal Areas Management (IWCAM) project for the Caribbean.

In its efforts to develop a water resource management plan for the Basseterre Valley Aquifer, the GEF has also supported greater collaboration among the national government, local communities, NGOs, and the private sector.

The project is working closely with the Caribbean Environmental Health Institute to reduce the impacts from agricultural pollution, domestic sewage, improper land use, and the inappropriate use of water resources. The project is taking an integrated coastal and watershed approach to help the government and local communities take practical actions to protect the aquifer's sensitive recharge area.

In 2002 the Office of the Prime Minister appointed the Basseterre Valley Advisory Committee to examine the feasibility of establishing a national park to protect the aquifer recharge area. The Project Steering Committee for the proposed Liamuiga National Park will include representatives from the relevant government departments, the community, NGOs, and the private sector. The Cabinet of St. Kitts and Nevis has already declared the lower part of the valley a protected area in advance of establishing this National Park.



## PROTECTING THE LAURA GROUNDWATER LENS IN MAJURO ATOLL

In Majuro Atoll, the capital of the Marshall Islands, groundwater supplements the primary source of drinking water, which is collected as rainfall on the airport runway. Majuro is one of the most densely populated places in the world and, in many places, is no wider than 400 meters. Like many parts of the island the village of Laura is

becoming increasingly urbanized, and this is putting the groundwater resource under increasing pressure. The GEF is supporting the Pacific Islands Applied Geoscience Commission (SOPAC) in a project to protect the groundwater lens at Laura through the use of zoning and better management practices. A SOPAC-produced Pacific

Drinking Water Safety Planning Guide has been used to help communities understand how to protect their groundwater resources and the Laura Water Lens Protection Coordinating Committee is helping to ensure ongoing coordination between government and community stakeholders.





A school of blue tangs swimming in clear blue water with green seaweed. The fish are vibrant blue with a yellowish-green stripe along their sides. The background is a deep blue, and the seaweed is bright green.

# Integrated Management of Coastal Resources





C

OASTAL ZONES ARE A MAJOR SOURCE OF FOOD AND RAW MATERIALS, AND MORE THAN ONE-THIRD OF THE WORLD'S POPULATION LIVES WITHIN 100 KM OF THE COAST OR ESTUARIES. EACH YEAR, ROUGHLY 50 MILLION PEOPLE MOVE INTO THESE COASTAL ZONES, WHICH ARE CRITICAL AREAS FOR TRADE AND TRANSPORT.

OUR COASTAL RESOURCES ARE LIMITED, AND THE ECONOMIC ACTIVITIES THAT COMPETE FOR THESE VITAL RESOURCES ARE LEADING TO MORE AND MORE CONFLICT. JUST ONE EXAMPLE IS THE INCREASING STRIFE BETWEEN FISH FARMERS AND TOURIST OPERATORS WHO COMPETE FOR PRIME COASTAL SPACE.

THE RATE OF COASTAL EROSION, RESOURCE DEPLETION, SOIL AND WATER CONTAMINATION, BIODIVERSITY DEGRADATION, AND HABITAT DESTRUCTION HAS ALSO INTENSIFIED. COASTAL ENVIRONMENTS ARE PARTICULARLY VULNERABLE TO OVEREXPLOITATION BECAUSE THEY INCLUDE LARGE AREAS THAT HAVE BEEN TRADITIONALLY PERCEIVED AS A PUBLIC "COMMONS."

INTEGRATED COASTAL MANAGEMENT (ICM) IS A STRATEGY THAT HAS EVOLVED OVER THE PAST DECADE TO EMBRACE A BROADER, MORE SYSTEMIC APPROACH TO THE MANAGEMENT OF COASTAL ENVIRONMENTS. THE GOAL OF ICM IS TO FOSTER THE SUSTAINABLE DEVELOPMENT OF COASTAL AREAS BY BRINGING TOGETHER GOVERNMENT TECHNICAL SPECIALISTS AND LOCAL STAKEHOLDERS.

THE GEF HAS RESPONDED TO REQUESTS FOR ASSISTANCE IN ICM ACROSS THE GLOBE, FROM THE RED SEA AND GULF OF AQABA TO THE MEDITERRANEAN, WEST AND EAST AFRICA, AND THE CARIBBEAN. BUT IT IS IN EAST ASIA, WITH ITS BURGEONING COASTAL GROWTH, THAT THE GEF INTERNATIONAL WATERS FOCAL AREA HAS CONCENTRATED ITS RESOURCES IN ORDER TO INTRODUCE ICM BEFORE NEGATIVE IMPACTS AND CONFLICTS BECOME IRREVERSIBLE.

## INTEGRATED COASTAL MANAGEMENT BENEFITS COASTAL COMMUNITIES IN CAMBODIA

Since the mid 1990s the GEF has supported the PEMSEA programme (Partnerships in Environmental Management for the Seas of East Asia) to spur cooperation among 12 coastal countries and to build the confidence of local government in the use of ICM as an effective management tool. The participating countries have adopted a Sustainable Development Strategy for the Seas of East Asia through the 2003 Putrajaya Declaration as a common platform for regional cooperation. This also provides a common framework for policy development including a critical commitment to place 20 percent of each country's coast under ICM by 2015.

The East Asian Seas region comprises six Large Marine Ecosystems (LMEs), including the East China Sea, the Yellow Sea, the South China Sea, the Sulu-Celebes Sea, the Indonesian Sea, and the Gulf of Thailand. The region is considered a world center for tropical marine biodiversity, supporting 30 percent of the world's coral reefs and mangroves. In the last 30 years 11 percent of the region's coral reefs have collapsed, while 48 percent are now in a critical condition. Mangroves have lost 70 percent of their cover in the last 70 years and, if the current rate of loss continues, all mangroves will be lost by 2030.

With the coasts of East Asia being so critically important for food, livelihoods, and economic



development for 1.5 billion people, the GEF has supported a series of International Waters projects with PEMSEA focused on ICM at local sites to complement its larger-scale interventions among nations sharing LMEs like the South China Sea and the Yellow Sea.

The PEMSEA programme was designed to enable the sustainable management of coastal and marine resources through intergovernmental, interagency, and intersectoral partnerships. Emphasis is placed on the demonstra-

*If the current rate of loss continues the East Asian Seas region will lose all its mangroves by 2030.*

Building Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)

Agency  
UNDP

GEF grant  
10.87 million

Co-financing  
27.6 million

Countries  
Cambodia, China, Korea DPR, Indonesia, Malaysia, Philippines, Republic of Korea, Thailand & Vietnam

Website  
<http://www.pemsea.org/>

tion of actual management actions on the ground in areas near ports and built-up areas at the scale of a city or province.

The participating countries established 11 ICM demonstration sites with initial financial support from the GEF along with 19 ICM parallel sites, with funding provided by local sources and know-how provided by GEF/UNDP PEMSEA. Local reforms were enacted at each of the sites, and the ICM framework has helped local governments to identify risks and areas vulnerable to sea-level rise and coastal storms.

At the national level, PEMSEA has prompted a range of actions including an executive order signed by President of the Philippines to replicate the PEMSEA ICM framework throughout the rest of the country. Based on the success of a project in Xiamen, China has developed national legislation requiring coastal sea-use zoning and management for the entire Chinese coastline.

The Government of Cambodia chose Sihanoukville, its only deep seawater port, as its ICM demonstration site for the PEMSEA programme. Rapid development has transformed this coastal city into a popular destination for increasing numbers of tourists, attracted by its white sandy beaches and abundant marine life. But this rapid development is placing increasing pressure on the coastal environment and Governor Spong Sarath says there is currently an “imbalance” between economic development and natural resource management in Sihanoukville.

“The municipality has to face several difficulties in relation to preserving and managing the coastal zone environment owing to population growth, demands for environmental



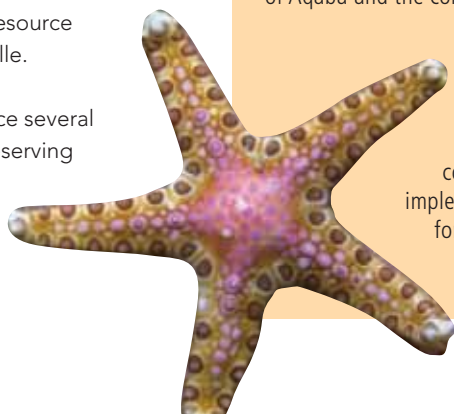
## ICM HELPS JORDAN PROTECT A SHARED REEF ECOSYSTEM

As part of the Middle East peace process in the early 1990s, environmental action plans were developed for the Gulf of Aqaba through the Environmental Multilateral Working Group. In Jordan, GEF/World Bank activities focused on establishing the legal and regulatory framework that was required to protect the marine park system and its sensitive coral reefs.

Through the GEF project, Jordan helped establish and implement a regional collaborative framework for sustainable management and protection of the Gulf of Aqaba and the conservation of its coral reefs. A regional mechanism for collaborative environmental management helped to protect the coastal zone and its marine biodiversity. The legal framework and regulations to control transboundary pollution were implemented and guidelines were established for the sustainable development of the

coastal zone. The Jordanian segment of the Red Sea Marine Park was also established.

In the Aqaba region, the project built capacity in environmental impact assessment, environmental inspection and auditing, industrial pollution prevention, and standard setting. It also supported coastal policing and enforcement, marine pollution prevention and response, marine park management, and increased public awareness activities. The key project elements, such as environmental impact assessment and environmental auditing procedures, have been fully incorporated into binding legislation in order to ensure their sustainability in the Aqaba Special Economic Zone Authority. Now all revenue from permit application fees and fines from environmental damage is earmarked for the Department of Environment, Regulation and Enforcement under the regional authority.



services, industry development, increased fishing efforts, and the growth of coastal tourism,” he says.

In order to protect its coastal assets the municipal government developed an ICM strategy together with a Policy Coordinating Committee composed of key representatives of various government agencies. To address a lack of local experience in ICM this work was supported by a team of young, junior professionals selected by PEMSEA from throughout the region. A series of consultations were held with more than 60 stakeholders from government agencies, NGOs, and the private sector to develop a common vision for the coastal area. Specific strategies and actions that would be needed to realize their common vision for the sustainable protection and management of their coastal and marine resources were then included in the Sihanoukville Coastal Strategy, which was formally adopted by the municipal government and other stakeholders in June 2003. A coastal zoning scheme was also

developed to avoid conflicts and conserve important biodiversity.

The Sihanoukville Coastal Management Committee has been established as a permanent multisectoral body providing the venue for discussion, policy direction, and monitoring of ICM activities. At the same time PEMSEA worked with the GEF/UNDP Small Grants Programme to support a priority community-based ICM project in the Stung Hav District, where local fishermen were experiencing conflicts with other fishing communities. After the project supported increased dialogue between these conflicting parties, the coastal mangrove habitat was ultimately rehabilitated and target areas for community fisheries were protected. Destructive fishing techniques are no longer tolerated, and investment in alternative livelihoods is expected to lead to better incomes.

Starting with just \$30,000 from the GEF, a similar amount of cofinancing,

and some PEMSEA know-how, a 5-hectare freshwater reservoir was also rehabilitated to provide freshwater supply for small-scale agricultural production. An additional benefit was the fact that the reservoir served as an artificial recharge area for the local groundwater supply wells that provide drinking water for the community. Nearly 2,500 families in Stung Hav have benefited from the project, and the coastal rehabilitation and improved fishing techniques will help the community to avoid potential conflicts with other communities in the area.



## RESEARCH NETWORK SUPPORTS GLOBAL FIGHT TO SAVE CORAL REEFS

Coral reefs, the rainforests of the ocean, provide food and income to millions of people. In addition to threats posed by local impacts, the survival of the world's coral reefs is now threatened by global warming and acidification. Even the lower range of warming scenarios used by the IPCC would have a devastating impact on reefs and the many communities that depend on them. The adoption of integrated coastal management (ICM) is urgently needed in order to save these critical ecosystems and maintain security in our coastal communities.

After the massive coral bleaching disaster that killed 16 percent of the planet's coral reefs in 1998, the GEF through the World Bank provided support for a new network of Centers of Excellence in coral reef research across the developing world. The Coral Reef Targeted Research and Capacity Building Project is helping to accelerate research into reef degradation and develop new management tools that can be used by developing countries.

By linking Centers of Excellence in Latin America, Africa, and Asia together with experts in Australia, the project has developed new tools for researchers and managers to understand and protect their reefs. The network has tested adaptive management scenarios for reef survival, explored possibilities for reef restoration, and fostered the publication of research so the global community can understand the stark message that our reefs are providing. In 2007 the GEF collaborators published sobering results in an article in *Science* suggesting we may have already passed the tipping point in the decline of many of the world's reefs.

Reducing carbon emissions is high on the list of measures to protect our coral reefs. But, as an adaptive management tool, the widespread application of ICM is vital if we want to minimize the hardship and social unrest that will accompany the collapse of reefs in tropical regions. ICM will help communities and governments to address the other stresses facing our reefs so that some may survive the warming and acidification, and the diseases that will follow.









# Reducing Coastal Dead Zones





**S**INCE THE EARLY 1960s, DEAD ZONES HAVE BEEN SPREADING ACROSS COASTAL OCEANS AT ALARMING RATES, RESULTING IN SERIOUS PROBLEMS FOR THE MARINE ENVIRONMENT. DEAD ZONES ARE CAUSED BY NITROGEN AND PHOSPHORUS FROM AGRICULTURAL RUNOFF, SEWAGE, AND THE BURNING OF FOSSIL FUELS. THESE EXCESSIVE NUTRIENTS CAN TRIGGER MASSIVE ALGAL BLOOMS THAT EVENTUALLY DIE AND CONSUME OXYGEN TO THE POINT WHERE MOST AQUATIC LIFE CAN NO LONGER SURVIVE.

THE MILLENNIUM ECOSYSTEM ASSESSMENT FOUND THAT HUMAN ACTIVITIES HAVE RESULTED IN THE NEAR DOUBLING OF NITROGEN AND TRIPLING OF PHOSPHORUS FLOWS TO THE MARINE ENVIRONMENT. THE NUMBER OF DEAD ZONES IS EXPANDING AND GLOBAL WARMING IS EXPECTED TO AGGRAVATE THE PROBLEM. DEAD ZONES HAVE NOW BEEN REPORTED FROM MORE THAN 400 SYSTEMS, AFFECTING A TOTAL AREA OF MORE THAN 245,000 SQUARE KILOMETERS, APPROXIMATELY THE SIZE OF THE UNITED KINGDOM.

OVER THE PAST DECADE THE GEF HAS SUPPORTED A NUMBER OF PROJECTS TO REDUCE NITROGEN AND PHOSPHORUS POLLUTION IN SOME OF THE WORLD'S MOST VULNERABLE WATER SYSTEMS SUCH AS THE DANUBE AND BLACK SEA BASIN, THE SEAS OF EAST ASIA, AND THE MEDITERRANEAN SEA. THE GEF HAS SUPPORTED 12 REGIONAL PROJECTS, 20 SINGLE-COUNTRY INVESTMENT PROJECTS WITHIN FOUR REGIONAL PARTNERSHIPS, AND SEPARATE FUNDS TO ENCOURAGE LOCAL INVESTMENT IN NUTRIENT REDUCTION.

EXCITING NEW PROJECTS INCLUDE THE DEVELOPMENT OF MAN-MADE WETLANDS THAT CAN MIMIC NATURE BY FILTERING AND CONSUMING POTENTIAL POLLUTANTS IN THE WASTEWATER STREAM. THIS LOW-COST TECHNOLOGY OFFERS REAL POTENTIAL TO REDUCE NUTRIENT POLLUTION WHILE ALSO RECLAIMING WASTEWATER FOR APPLICATION IN AGRICULTURE AND AQUACULTURE. BECAUSE IT IS CHEAPER THAN CONVENTIONAL WASTEWATER TREATMENT SYSTEMS, THIS TECHNOLOGY IS IDEAL FOR DEVELOPING COUNTRIES, PARTICULARLY IN RURAL AREAS.

## REDUCING NUTRIENT POLLUTION IN THE DANUBE AND THE BLACK SEA

In the 1970s and 1980s, growing levels of nutrient pollution from wastewater and agricultural activities had a severe impact on the health of the Danube and the Black Sea. In the Black Sea this problem reached a peak in 1990, when about 40,000 km<sup>2</sup> of its northwest shelf was effectively considered dead, resulting in a massive loss of animal life.

Now GEF-funded action in the Danube–Black Sea Basin provides a model for the international cooperation so urgently needed to reduce land-based pollution and the growing threat

of marine dead zones. Since 1991, GEF investments of \$100 million, accompanied by \$400 million in cofinancing, have acted as a vital catalyst for nutrient reduction activities at the regional, national, and community levels. While the GEF-supported projects cannot take the overall credit for the improvement in basin water quality and ecosystems, there is wide recognition of its catalytic role in supporting action to reduce nitrogen and phosphorus pollution.

Since the mid-1990s there has been a significant improvement in the Danube

and Black Sea environment. In the last 15 years nitrogen emissions have decreased by about 20 percent and phosphorus by almost 50 percent. The northwest shelf of the Black Sea is now showing remarkable signs of recovery, the dead zone has been virtually eliminated, and the number of species has almost doubled from 1980 levels.

This observed recovery has been linked to the economic collapse in Central and Eastern Europe in the early 1990s, with the subsequent closure of livestock facilities and a dramatic



Danube/Black Sea Basin Strategic Partnership  
on Nutrient Reduction

Agency  
World Bank

GEF grant  
71.7 million

Co-financing  
195.7 million

Countries  
Bosnia-Herzegovina, Bulgaria, Croatia,  
Czech Republic, Georgia, Hungary,  
Moldova, Romania, Russian Federation,  
Serbia, Slovenia, Slovak Republic,  
Turkey & Ukraine

Website  
<http://www.worldbank.org/blacksea>

reduction in the use of fertilizers. But the improvement can also be attributed to the significant nutrient reductions achieved through the investments and governance reforms promoted through the GEF Strategic Partnership and the EU accession process.

The Strategic Partnership for the Black Sea and Danube Basin was launched in 2001 with initial funding of \$95 million in GEF grants. As one of the GEF's largest, and perhaps most ambitious water-related projects, its long-term objective is to encourage countries to reduce nutrient pollution to levels that will permit ecosystems to recover to similar conditions as those observed in the 1960s.

Through the partnership, the GEF has worked closely with the United Nations Development Programme and the World Bank to support a range of pilot projects to reduce nutrient loads from agriculture, industry, and municipal sewage. Projects include the promotion of low-cost wastewater treatment methods, constructing manure management facilities, and protecting wetland areas. GEF-funded pilot demonstration projects have successfully complemented EU-funded investments in the water and agriculture sectors and serve as a model for similar initiatives in other regions such as the Mediterranean and the seas of East Asia.

DANUBE AND BLACK SEA BASIN INVESTMENT FUND PROJECTS	
ROMANIA	Agricultural Pollution Control
BULGARIA	Wetlands Restoration
MOLDOVA	Agricultural Pollution Control
TURKEY	Watershed Rehabilitation
SERBIA	Enterprise Pollution Reduction
BOSNIA	Water Quality Protection
HUNGARY	Nutrient Reduction from Sewage
MOLDOVA	Environmental Infrastructure
ROMANIA	Environmental Management
CROATIA	Agricultural Pollution Control
UKRAINE	Odessa Nutrient Reduction

The Investment Fund for Nutrient Reduction, established by the GEF and managed by the World Bank, was designed to catalyze investments and accelerate action by other stakeholders interested in the recovery of the Black Sea. The investment fund aimed to leverage \$210 million to complement \$70 million in GEF grant funds for nutrient reduction investments in the agriculture and municipal and industrial wastewater treatment sectors, and for wetland restoration.



## REPLICATING A SUCCESSFUL PILOT TO REDUCE NUTRIENTS IN ROMANIA

In the region of Calarasi in southeast Romania a GEF/World Bank grant of \$5.15 million helped to support a \$10.8 million project to reduce nitrogen pollution from agricultural activities. The project supported the introduction of manure management and other environmentally friendly agricultural practices across an area of 410,000 ha of arable land bordering the Danube.

Calarasi includes 48 communities with a total population of 332,000. As in many rural parts of Romania there was an expectation that agricultural activities would intensify following the country's accession to the EU and its Common Agricultural Policy. Due to the success of the project the area has now measured a reduction in nutrients entering the Danube estimated at 15 percent for nitrogen and 27 percent for phosphorus. The land area covered by environmentally friendly practices increased from zero to almost 35 percent. The percentage of households using manure storage and segregating organic waste materials went from zero to almost 55 percent and the amount of manure being applied as fertilizer went from 2 percent to 34 percent.

The success of the project has been attributed to provision of simple technologies that are supported by local authorities and provide tangible benefits to the target communities. For example, a public awareness campaign helped to stress the economic benefits of environmentally friendly agricultural practices, such as using manure as fertilizer.

Another key to success was understanding the basic need to develop proper storage facilities for the community. An initial survey of local farmers found that many had no alternative but to dump their waste on unauthorized dumping sites that were prone to leakage.

In 2007 the Romanian Government decided to adopt the best practices for nitrogen reduction successfully demonstrated in Calarasi across the rest of the country. A new \$68.1 million loan from the World Bank, together with a \$5.5 million GEF grant, is now helping Romania to scale up these new approaches to reduce nutrient levels in all vulnerable parts of the country.



## INVESTING IN CLEANER PRODUCTION IN THE DANUBE RIVER BASIN

Industries in the lower Danube countries have faced numerous challenges in their move toward market-driven economies. The TEST (Transfer of Environmentally Sound Technology) project demonstrated to industries in Bulgaria, Croatia, Hungary, Romania, and Slovakia that it is possible to comply with environmental standards while also enhancing their efficiency and competitiveness.

The project concentrated on building capacity in cleaner production and the assessments needed to identify the least costly options for environmental compliance. The 17 demonstration sites selected for the project included: alcohol production; fish processing; textiles meat rendering and processing; pesticide production; sugar production; chemical and petrochemical production; and mechanical and railway rolling stock repair and reconditioning.

The project worked with environmental management institutions to train selected enterprises in the implementation and adoption of an appropriate suite of TEST tools. These tools included: cleaner production; environmental management systems and accounting; and the selection of environmentally sound technology.

More than 700 employees from the demonstration enterprises and from national institutions were trained in the TEST approach. By the end of the project more than 230 cleaner production measures were implemented at the selected enterprises, leading to total financial savings equivalent to \$1.3 million per year. Environmental management systems were introduced in 11 companies and 4 companies received international ISO14001 accreditation.

Wastewater discharges were reduced by 4.59 million cubic meters per year, with an additional 7.86 million cubic meters reduction expected on full implementation of the TEST investments. An annual reduction of more than three tonnes of pollutants was achieved, along with energy savings of 200,000kWh/year.

Participating companies quickly came to understand the benefits of the TEST approach in terms being able to compete within a wider market. It is now expected that the national counterparts trained through the TEST project will pass on this expertise to other enterprises and institutions in their own countries and throughout the Danube River Basin.



## NO FOSFOS — CAMPAIGNING TO REDUCE PHOSPHATE POLLUTION IN SARAJEVO

In Sarajevo, Bosnia and Herzegovina, a Small Grant Project supported the NGO Ekotim to raise awareness among consumers about the links between their detergent use and water pollution from phosphates. Their communication activities proved highly successful, reaching some 200,000 Sarajevo citizens.

Sarajevo's wastewater treatment facility was destroyed during the war. Ever since, untreated residential and industrial wastewater has poured into the local Miljacka River, which feeds into the Danube. One of the main problems was that it was still possible for local householders to buy laundry detergents containing more than 30 percent phosphate.

Ekotim received a grant from the UNDP/GEF Danube Regional Project to reduce phosphate pollution from the use of household detergents. The "No FOSFOS" project aimed to raise awareness among Sarajevo consumers about

the links between their detergent use and water pollution and promote the use of phosphate-free detergents.

Over 20,000 leaflets were distributed in a wide range of places, including shopping centers, bars, and street actions. A radio jingle was played 10 times a day for 11 months, on 20 radio shows, reaching the ears of over 150,000 people. Other actions included the distribution of 9,000 postcards throughout the city, workshops in schools, advertising billboards placed in public toilets, and stories in national newspapers.

A Bosnian company ended up developing a new line of phosphate-free detergents, and postcampaign testing of city wastewater showed the campaign reduced total phosphorus discharge to the river from 310 to 245 kg per day.

## LAKE MANZALA LEADS THE WAY IN CONSTRUCTED WETLANDS TECHNOLOGY



*The success of a constructed wetland project in Egypt's Lake Manzala has created global interest in the potential of this technology as a low-cost and low-maintenance alternative for treating wastewater.*

Constructed wetlands are among a suite of technologies that are being tested by GEF International Waters projects around the world to decrease the release of nutrients into fresh and marine water systems. Constructed wetlands provide an economically and environmentally sound alternative to traditional wastewater treatment facilities. Operation and maintenance costs are low and they provide additional benefits such as the creation of wildlife habitats for wetland species.

The success of a constructed wetland project in Egypt's Lake Manzala has created global interest in the potential of this technology as a low-cost and low-maintenance alternative for treating wastewater. At just one-quarter of the cost of conventional methods the pilot wetland has removed 61 percent of the biological oxygen demand, 80 percent of suspended solids, 15 percent of total phosphorous, 51 percent total nitrogen, and 97 percent of total coliform bacteria.

Lake Manzala is a shallow brackish lake of approximately 1,000 km<sup>2</sup> located on the north eastern edge of the Nile Delta, and only separated from the Mediterranean Sea by a sandy beach ridge. Polluted water has long entered the lake and eventually the sea from nearby urban centers such as Cairo and other sources such as agriculture and industry.

Pollution of Lake Manzala has seriously threatened the health of local people and the viability of economic activities such as fisheries, raising livestock, and farming. Lake Manzala is an internationally registered Important Bird Area and pollution threatens the lake's entire ecosystem. Large areas in the northwest of the lake have been turned into fish farms, while much of the southern part has been divided into large plots and drained, in preparation for its conversion to agricultural use. In the past 70 years the area of natural wetlands has shrunk from 700,000 to 200,000 acres.

Constructed wetlands are an imitation of natural wetlands, which are well known for their ability to improve water quality. When water enters a natural wetland loaded with a high concentration of suspended matter, nutrients, heavy metals, and toxins, it leaves the other end with reduced loads of these contaminants and pollutants, most of which are taken up by the wetland plants.

At Lake Manzala the wastewater is pumped into ponds where sediments are allowed to settle. The water then flows through 60 acres of constructed wetlands where more than 75 percent of toxins are removed. Even in its experimental stage the wetland treated

Lake Manzala Engineered Wetlands

Agency  
UNDP

GEF grant  
5.3 million

Co-financing  
6.6 million

Countries  
Egypt

Website  
[http://www.undp.org/gef/05/spotlight/lake\\_manzala.html](http://www.undp.org/gef/05/spotlight/lake_manzala.html)



25,000 cubic meters of wastewater per day from the Bahr EL-Baqar drain.

The final product is similar in quality to the water derived from conventional sewage systems, and it is mostly used for irrigation and agriculture, relieving pressure on limited freshwater resources.

The lower Nile Delta area is used extensively for fish farming, and results indicate that fish raised in ponds using the treated water are fit for human consumption. The project has included the construction of 60 acres of fish ponds, and once the farm is at full production, this income will offset the operating costs for the entire facility.

The Egyptian government is keen to replicate the project in other suitable locations across the Nile Delta, and the success of the project has already prompted the creation of two additional constructed wetlands, bringing the total in the Port Said governorate to four. The project could also help to spur the Egyptian government toward replenishing and protecting the natural wetland systems in the Delta. The demonstration at Lake Manzala has created international visibility for constructed wetlands and it now provides Egypt with the opportunity to become a recognized leader in the development of this innovative technology.

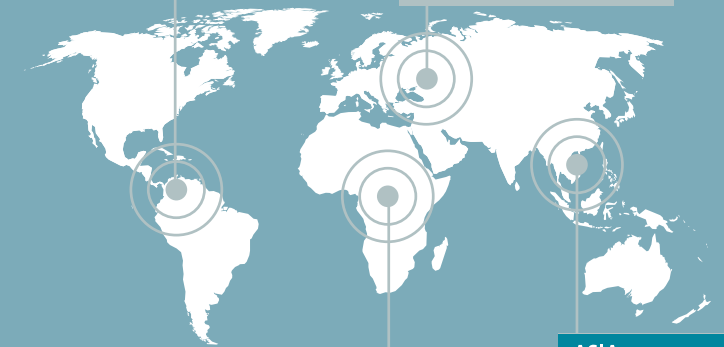
## GEF HAS SUPPORTED THE USE OF CONSTRUCTED WETLANDS IN THE FOLLOWING REGIONS

### LATIN AMERICA

Constructed wetland implemented in village for treatment of household wastewater (IWCAM)

### EASTERN EUROPE

Integrated Water and Ecosystems Management Project  
Integrated Ecosystem Management in the Prespa Lakes Basin of Albania  
Water Quality Protection Project  
Wetland Restoration and Pollution Reduction Project  
Reduction of Nutrient Discharges  
Agricultural Pollution Control Project



### AFRICA

Lake Manzala constructed wetland  
Household wastewater management on Pemba Island  
A wetland-lagoon system for wastewater management at Shimo La Tewa Prison, Mombasa

### ASIA

Ningbo Water and Environment Project





# An Ecosystem-Based Approach to Coastal Fisheries Management





INTENSIFYING HUMAN EXPLOITATION IS PUSHING THE WORLD'S OCEANS TO THE LIMITS OF THEIR ECOLOGICAL CARRYING CAPACITY. ACCORDING TO THE MOST RECENT FOOD AND AGRICULTURAL ORGANIZATION (FAO) REPORT MORE THAN 75 PERCENT OF WORLD FISH STOCKS ARE ALREADY FULLY EXPLOITED, OVEREXPLOITED, DEPLETED, OR RECOVERING FROM DEPLETION. THE SITUATION IS EVEN MORE CRITICAL FOR SOME HIGHLY MIGRATORY SPECIES THAT ARE EXPLOITED SOLELY OR PARTLY IN THE HIGH SEAS.

THE \$70 BILLION ANNUAL TRADE IN INTERNATIONAL FISHERIES PRODUCTS IS COMING UNDER INCREASING RISK AS THE LARGER SPECIES ARE SYSTEMATICALLY REMOVED FROM OUR OCEANS. MAKING MATTERS WORSE, POLLUTION AND OTHER HUMAN ACTIVITY ON THE COASTS IS REMOVING KEY SPAWNING AND NURSERY HABITATS. THE SERIOUS DEPLETION OF COASTAL AND MARINE FISH STOCKS IS NOW THREATENING OUR BIOLOGICAL DIVERSITY AND THE WELL-BEING OF OUR COASTAL COMMUNITIES.

IN 1995 THE GEF COUNCIL INTRODUCED THE CONCEPT OF LARGE MARINE ECOSYSTEMS (LMEs) AS A VEHICLE TO FOSTER THE ECOSYSTEM-BASED MANAGEMENT OF TRANSBOUNDARY COASTAL AND MARINE RESOURCES. EIGHTY-FIVE PERCENT OF GLOBAL FISH CATCH COMES FROM 64 LMEs THAT PARALLEL THE CONTINENTAL SHELVES. BY MANAGING EACH LME AS A UNIT AND ADDRESSING THE MULTIPLE STRESSES TO MARINE SYSTEMS, THE GEF IS SUPPORTING AN ALTERNATIVE TO THE TRADITIONAL APPROACH OF MANAGING SINGLE SPECIES. THIS ECOSYSTEM APPROACH ACKNOWLEDGES THAT CHANGES IN HABITATS WILL AFFECT THE AVERAGE SUSTAINABLE YIELD AND THAT DIFFERENT FISHERIES ARE LINKED THROUGH CATCHES AND THE FOOD WEB.

THE GEF HELPS COUNTRIES WITH THE DEVELOPMENT OF INSTITUTIONS THAT USE THESE APPROACHES, AND COUNTRIES AROUND LMEs HAVE BEEN EAGER TO COLLABORATE TO ENSURE SUSTAINABLE USE OF THEIR SHARED COASTAL AND MARINE RESOURCES. WITH GEF SUPPORT, 124 DIFFERENT COUNTRIES ARE NOW WORKING TOGETHER ON 19 SHARED LMEs AS IS SHOWN IN THE BOX ON PAGE 51.

## ADAPTING TO A FLUCTUATING CLIMATE IN THE BENGUELA CURRENT

Much emphasis has been made of the need for climate change adaptation activities on land. However, the rapid warming of the oceans is causing fish populations to move, and one notable case of decadal ocean fluctuations involves the Benguela Current Large Marine Ecosystem (LME), the second



most productive fishery in the world. In the 1980s scientists found that warming in the Benguela was shifting currents and negatively affecting fisheries and sensitive biodiversity such as penguins and seals.

Sweeping along the coast of southwestern Africa, the Benguela Current LME stretches from the Cape of Good Hope northward into Angolan waters, encompassing the full extent of Namibia's marine environment. The nutrients that rise from the depths of the ocean along this current make it an important center of marine biodiversity and global marine food production. In addition to a fluctuating climate, the Benguela Current has also been stressed by overfishing, oil and gas extraction, and diamond mining.

In 1998 the countries reliant on the Benguela (Angola, Namibia, and South Africa) requested GEF assistance to prepare an International Waters project to help manage their shared marine ecosystem. With UNDP assistance each country established national interministry committees and worked together to assemble the facts in a transboundary diagnostic analysis. This enabled the countries to produce a Strategic Action Programme of reforms and actions that they would collectively commit to. This included

joint surveys and assessments of shared fish stocks, standardized management approaches, adherence to established codes of conduct for fishing, monitoring of ecosystem health and algal blooms, and capacity development for key staff and institutions.

The diagnostic analysis enabled stakeholders in each country to understand the complex concerns and opportunities that exist. While the national interministry committees promoted integrated approaches across sectors to enable the collective management of shared coastal and marine systems.

The diagnostic analysis and the Strategic Action Programme provided a shared vision for action to protect their economic and community interests in the Benguela Current. The resulting project led to establishment of the world's first LME Commission — the Benguela Current Commission (BCC) — and a science advisory body to support the regional management of the LME. The cooperative relationship established by the project was critical to convincing the three countries to contribute more than \$18 million toward implementation of the Strategic Action Programme, including staff, laboratories, equipment, and the use of research vessels.

Implementation of the Strategic Action Programme (SAP)  
Toward Achievement of the Integrated Management of  
the Benguela Current Large Marine Ecosystem (LME)

Agency  
UNDP

GEF grant  
15.46 million

Co-financing  
23.45 million

Countries  
Angola, Namibia, South Africa

Website  
<http://www.bclme.org/>

The new Benguela Current Commission is a regional institution that will deal with conflict resolution, transboundary marine resource management, and regulatory and environmental protection issues in the Benguela Current LME. The commission will draw on inputs from several ministries in each partner country, including foreign affairs, finance, fisheries, minerals and energy, environment, and tourism.

When scientists found the fluctuating climate was putting the complex system and its fisheries at even more risk the countries committed, in a second GEF project, to negotiate a regional treaty formalizing the Benguela Current Commission and their country commitments. A new regional framework will ensure that any negative impacts from economic activities, such as offshore mineral exploration, will not destroy livelihoods of coastal communities that are dependent on the sea. This final GEF intervention is now underway as countries utilize monitoring systems to forecast the behavior of the ocean and adjust their fisheries and economic activities to adapt to the fluctuating ocean.



## FISH REFUGIA STRENGTHEN COLLABORATION IN THE SOUTH CHINA SEA



The Large Marine Ecosystems around the South China Sea and the adjacent Gulf of Thailand include global centers of shallow marine biological diversity that support one of the world's largest fisheries.

In the GEF/UNEP project, *Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand*, seven countries came together to address the degradation of coastal habitats, the overexploitation of fisheries, and land-based pollution. This project demonstrated that collective management is possible even when border disputes exist over access to oil, gas, and fisheries.

Cambodia's Minister for the Environment, Senior Minister Dr. Mok Mareth, says the GEF project has helped to strengthen regional cooperation on a range of shared environmental issues.

"The project has provided a comprehensive regional framework where people can work together to address common coastal environmental concerns and it has provided the necessary tools that we have used to effectively engage the various sectors from local stakeholders to national government agencies," he says.

Cambodia has derived important benefits from the extensive network of regional experts the project helped to bring together to work across the seven participating countries. These experts have provided training, expert advice, and guidance in the development of management plans for seagrass in Kampot and mangroves and wetlands in Koh Kong.

The project's Regional Working Group on Fisheries also developed "Fish Refugia" as a special technique for managing important coastal fisheries areas together with local communities and fisherfolk.

In Fish Refugia, key habitats such as sea grass beds, corals, mangroves, and tidal flats serve as an alternative to unpopular marine protected areas (MPAs) that are seen to reduce local access to key resources. In these areas critical information about spawning and nursery areas is used to protect juvenile fish by restricting fishing activity during specific times of the year. While no-take MPAs are viewed as unacceptable in many fishing communities, the Fish Refugia concepts of comanagement, limited fishing times, and the prohibition of certain fishing gear is more acceptable and simpler to understand.



*“The project has provided a comprehensive regional framework where people can work together to address common coastal environmental concerns.”*

Senior Minister Dr. Mok Mareth, Cambodia’s Minister for the Environment

The participating countries have now developed a list of 52 known spawning and nursery areas that represent a system of Fish Refugia for the South China Sea and its adjacent gulf. The project has also supported the implementation of 14 demonstration sites and intergovernmentally approved guidelines for the establishment of Fish Refugia that now constitute part of regional Guidelines for Responsible Fisheries in South East Asia.

Senior Minister Mareth believes the success of the Fish Refugia concept clearly illustrates the local benefits of collaborating across the region.

“A significant outcome of the joint actions amongst the countries bordering the South China Sea has been the development of the Fish Refugia concept into an operational mechanism for sustaining future fish stocks in the coastal waters,” he says.



## SUPPORTING A NEW CONVENTION FOR PACIFIC FISHERIES

The waters surrounding the small island developing states of the Pacific support the largest tuna fishery of any ocean. In 2007 the tuna harvest from the western and central Pacific was estimated to be 2.4 million tonnes, which is 55 percent of the global tuna catch.

In 2004, support provided by the GEF-funded Pacific Islands Oceanic Fisheries Management Project led directly to the establishment of the Western and Central Pacific Fisheries Commission. The Commission now has responsibility for the conservation, management, and sustainable use of tuna resources across a convention area that covers approximately 100 million square kilometers — or 20 percent of the earth's surface.

The GEF project supported the Pacific island nations as they negotiated a new, ecosystem-based convention, for the warm water pool of the Pacific with distant water fishing nations. One of the goals of the *Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean* is to ensure that all Pacific countries benefit from the sustainable management of a regional resource worth over \$4 billion a year.

The Western and Central Pacific Fisheries Commission works to secure a sustainable

future for the industry, securing economic benefits for island countries while at the same time minimizing negative impacts of fisheries such by-catches of turtles and sharks. The Commission implements and monitors the Convention from its Secretariat in the Federated States of Micronesia. Executive Director, Andrew Wright, says the GEF project played a critical role in enabling Pacific island nations to sustain a strong influence and avoid any disadvantageous outcomes throughout the 10-year process of negotiating the Convention with distant water fishing nations.

"There's no doubt that the support of the GEF to the process that led to the successful negotiation of the convention establishing the Western and Central Pacific Fisheries Commission was a major factor contributing to a successful outcome. The institutional design of the Commission now sets a global model for the full participation of small island developing states in the work of regional fisheries management organizations," he says.

The Oceanic Fisheries Management Project was designed to enhance knowledge of the Western Pacific Warm Pool Ecosystem and help the region optimize sustainable economic returns from its rich tuna stocks. The scientific



information generated by the project continues to support regional and national efforts to manage these critical resources for the benefit of Pacific island peoples. Conservation and management measures have now been adopted to mitigate possibilities of overfishing bigeye and yellowfin tuna stocks. Purse seine catches will be capped at 2004 levels, a catch quota will be introduced for the bigeye longline fishery, and no increases will be permitted in the number of vessels fishing for albacore in both the north and south Pacific Ocean.

Together with the professional and technical advisory support of the Pacific

Pacific Islands Oceanic Fisheries Management Project

Agency  
UNDP

GEF grant  
11.6 million

Co-financing  
79.1 million

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

Website  
<http://www.ifa.int/gef/>

Islands Forum Fisheries Agency and the Secretariat of the Pacific Community's Oceanic Fisheries Programme, many Pacific island nations are conducting reviews of their legal, policy, and institutional arrangements, their national fisheries status, and management plans relating to the Convention. Tuna management plans have been developed in the Cook Islands, Fiji, Kiribati, Marshall Islands, Niue, Tuvalu, and Vanuatu. A Tuna Fishery Data Management System has also been installed and is operating in 12 of the 17 Pacific island states. A compliance programme for the Convention, including appointing observers, providing a mechanism for boarding and inspection on the high seas, the implementation of a satellite-based near real-time vessel monitoring system, and the application of sanctions, has now also begun.

The remaining challenge is to connect the spawning areas of East Asia to the Treaty so that the entire tuna ecosystem can be managed sustainably under a regional institution. A proposal from UNDP has already been approved by the GEF for funding to take this next step.

## REDUCING WASTEFUL BY-CATCH FROM SHRIMP TRAWLING

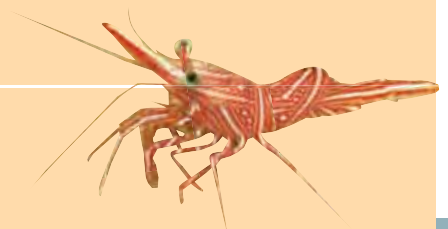
Over 60 percent of what is currently caught in the global shrimp fishery is discarded, making it among the most environmentally damaging fisheries in the world. But a pioneering project by GEF/UNEP/FAO has dramatically cut the unwanted catch of young fish, turtles, and other by-catch by as much as 30 to 70 percent in some countries.

In almost all participating countries sea trials have been conducted with environmentally friendly trawls and improved fishing methods. Some of the best results are coming from Mexico, where over 2,000 shrimpers trawl off the Pacific and Gulf of Mexico coasts. Research boats with high-tech sensors and underwater monitors were used to assess the effectiveness of the new trawls and trawling methods.

Over 140 vessels are voluntarily using the new methods, and the number is increasing due to improvements in shrimp quality and

catches. Trawl nets now contain less unwanted, nontarget fish, and other marine organisms. This is making it easier and quicker for fishermen to process the shrimp, leading to savings in terms of time and money and the improved quality of the catch. Reduced fuel consumption and up to 20 percent increases in shrimp catch were key selling points for the new by-catch reduction trawls.

The project is helping to introduce different by-catch reduction technologies that take into account specific environmental conditions and interests of the participating countries. Close collaboration between the fishing industry, research institutes and governments has resulted in use of by-catch reduction technologies previously available only for more developed nations.



## PROTECTING SEAMOUNT ECOSYSTEMS IN THE SOUTHERN INDIAN OCEAN

A new UNDP/GEF project focused on seamount ecosystems in the southern Indian Ocean is designed to promote sustainable fisheries management and the conservation of marine biodiversity in the high seas.

The global depletion of inshore and continental shelf fisheries, coupled with improvements in fishing technology, has increased commercial fishing in the high seas. Between 1992 and 2002 the fish caught on the high seas in relation to the global marine catch rose from 5 percent to 11 percent. Many commercial fishing boats are now operating in areas beyond national exclusive economic zones (EEZs) where they are subject to weak regulation.

As hotspots of biological diversity, seamounts host species such as tuna and orange roughy that attract commercial fishing activities. Because of our poor understanding of seamounts, and the lack of governance and regulation in the high seas, this intensifying fishing activity now poses a major threat to global marine biodiversity.

Little is known about seamount ecology and biodiversity in the southern Indian Ocean, and no governance body currently has the

mandate to conserve and manage deep-sea ecosystems in this region. The Southern Indian Ocean Fisheries Agreement (SIOFA) is not yet in force, and the Indian Ocean Tuna Commission (IOTC) is only responsible for the conservation and management of tuna and tuna-like species.

These gaps can lead to the overexploitation of marine resources and destruction of benthic habitats. In just a few years deep-sea bottom fisheries can damage commercially important fish populations and slow-growing species on the deep seabed such as cold water corals and sponges.

The new GEF project will enhance our scientific knowledge about seamount ecosystems and support the development of a comprehensive governance framework for marine biodiversity in the southern Indian Ocean. The project will increase public awareness about deep-sea marine biodiversity and serve as a demonstration project for the development of robust conservation and management measures for marine biodiversity in areas beyond national jurisdiction.





# Reducing Environmental Risks from Maritime Transport





**T**HE SAFE AND EFFICIENT OPERATION OF PORTS IS ESSENTIAL FOR GLOBAL TRADE BUT, IN RECENT YEARS, THE RISK OF ENVIRONMENTAL DAMAGE FROM SHIP WASTE AND POLLUTION DISCHARGE HAS BEEN INCREASING. IN THE 1990s MANY GEF INTERNATIONAL WATERS PROJECTS WERE DEVELOPED TO ADDRESS POLLUTION FROM MARITIME TRANSPORT. NINE SHIP WASTE PROJECTS, AND FIVE OTHERS WITH MARITIME TRANSPORT COMPONENTS, RECEIVED GRANTS WORTH \$115 MILLION TO ADDRESS A WIDE RANGE OF ISSUES.

GEF PROJECTS HAVE HELPED TO IMPROVE PORT MANAGEMENT AND FACILITIES, ADDRESS SPILL PREVENTION, AND SUPPORT CONTINGENCY PLANNING FOR SPECIAL TRANSPORT AREAS, SUCH AS THE MEDITERRANEAN AND THE CARIBBEAN. THE GEF HAS ALSO HELPED TO BUILD THE CAPACITY NEEDED FOR COUNTRIES TO SIGN AND RATIFY MARITIME-RELATED GLOBAL CONVENTIONS SUCH AS THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS (MARPOL). STILL MORE PROJECTS HAVE HELPED TO ADDRESS THE RISKS POSED BY INVASIVE SPECIES CARRIED IN BALLAST WATER AND TO MINIMIZE THE TRANSFER OF PATHOGENS.

ENVIRONMENTAL AND HEALTH SECURITY RISKS FROM SHIPPING WILL ONLY BE SOLVED IF THE PRIVATE SECTOR ALSO WEIGHS IN WITH ITS VAST TECHNICAL, MANAGERIAL, AND FINANCIAL RESOURCES AND EXPERTISE. BOTH THE GEF AND THE INTERNATIONAL MARITIME ORGANIZATION (IMO) ARE NOW WORKING TO SUPPORT INCREASED CORPORATE RESPONSIBILITY BY THE MARITIME TRANSPORT INDUSTRY.

# GLOBALLAST — STOPPING THE BALLAST WATER STOWAWAYS

Every year international shipping carries billions of tonnes of ballast water around the world. Unfortunately, this ballast water can also transport invasive species that can quickly overwhelm local ecosystems. Notorious examples of ballast water bio-invasions include the Comb Jelly (*Mnemiopsis leidyi*), which contributed to the collapse of the Black Sea fisheries, the Zebra Mussel in North America, and the Asian Golden Mussel in the inland waterways of Argentina, Brazil, Paraguay, and Uruguay.

Aquatic invasive species are one of the single greatest threats to global marine biodiversity and ecosystems. They are also a significant threat to coastal economies and even public health. The global economic impacts of invasive aquatic species have been estimated at \$100 billion per year. The transfer of invasive aquatic species in ballast water now stands as the biggest and most vexing environmental challenge facing the global shipping industry.

The economic and environmental impacts of invasive species are expected to grow with the three-fold increase in shipping activity predicted over the next decade. Developing countries in Africa, Asia, and South America are at particular risk, as globalization continues and new markets, ports, and shipping routes are opened up in these areas.

In response to this aquatic threat, UNDP-GEF joined forces with the IMO in 2000 to implement the Global Ballast Water Management Programme (GloBallast), which provides institutional strengthening, capacity development, and technical cooperation to developing countries to address the threat posed by aquatic invasives.

GloBallast was implemented in six pilot countries representing six developing regions. The pilot phase was designed to establish cooperative regional arrangements and develop tools and systems that could be effectively used elsewhere.

The success of the GloBallast Programme also prompted adoption of the Ballast Water Management Convention in February 2004. This has provided a standardized international regime to address the global threat arising from the ballast water transfer of invasive species. GloBallast is playing a crucial role in providing technical assistance to developing countries to enact legal, policy, and institutional reforms to implement the convention.

As part of the GloBallast Partnerships Project framework the GEF is also pioneering a public-private sector partnership to reduce the transfer of harmful invasive species and pathogens via ballast water. Current members of the Global Industry Alliance (GIA) for Marine Biosecurity include shipping giants such as BP Shipping, Vela Marine International, Daewoo Ship Building, and APL. This alliance of maritime industry leaders and industry umbrella organizations is working together with GloBallast Partnerships and the GEF on a range of ballast water management and marine biosecurity initiatives.

In addition to projects totally devoted to maritime transport, several regional projects have included components on ship-related concerns. GEF and the Inter-American

*The transfer of invasive aquatic species in ballast water now stands as the biggest and most vexing environmental challenge facing the global shipping industry.*

GloBallast

Agency  
UNDP/IMO

GEF grant  
5.7 million

Co-financing  
17.7 million

Countries

Algeria, Angola, Argentina, Brazil, Chile, China, Costa Rica, Cote D'Ivoire, Croatia, Egypt, Ecuador, Ghana, Guatemala, India, Iran, Jordan, Libya, Mexico, Morocco, Panama, Peru, Trinidad & Tobago, Turkey, South Africa, Sudan, Venezuela, Ukraine, Yemen

Website

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



Development Bank are working together on a project to protect the Gulf of Honduras by reducing maritime pollution in its major ports and navigation lanes. The project is working to improve navigational safety to avoid groundings and spills and to reduce land-based sources of pollution draining into the gulf.

In the Gulf of Aqaba project a special by-law was enacted by the Aqaba Special Economic Zone Authority (ASEZA), including provisions regulating pollution from ships, reflecting the Kingdom of Jordan's commitment to implementing its obligations under MARPOL. The financial liability provisions pertaining to ship-based pollution include specified penalties per incident, damage recovery, and an additional ASEZA surcharge amounting to 25 percent of all assessed penalties and damages. A special coastal police was also established to enforce marine vessel pollution prevention measures.



## PEMSEA HELPS SECURE THE GULF OF THAILAND FROM MARITIME TRANSPORT RISKS

Given the hazardous nature of some cargo the PEMSEA Programme (Partnerships in Environmental Management for the Seas of East Asia) has been helping partner countries to integrate environmental concerns into port governance and management regimes. PEMSEA assists ports in adopting recognized international standards of management, namely ISO 9001 (Quality Management) and ISO 14001 (Environmental Management) as part of its ICM programmes. Danang in Vietnam and Xiamen in China both provide good examples of these certification programmes in action.

With help from PEMSEA, the governments of Cambodia, Thailand, and Vietnam have also adopted a Joint Statement

on Partnerships in Oil Spill Preparedness and Response in the Gulf of Thailand. The agreement commits the three countries to mutual support and assistance in combating oil spills and safeguarding coastal water resources. A Gulf of Thailand Secretariat has been established to promote joint management of the sensitive water body. Thailand has established an information-sharing system to support regional oil spill response efforts and Vietnam has established a National Southern Oil Spill Response Centre in Ho Chi Minh City. Cambodia is also developing a national system for oil spill preparedness, response, and cooperation.



An aerial photograph of a tropical island. The foreground and middle ground are dominated by a dense, lush green forest of palm trees. To the left, a large, irregularly shaped lagoon with clear, turquoise water is visible, surrounded by a narrow strip of white sand beach. The lagoon's water transitions from a light blue near the shore to a deeper blue further out. In the background, the island continues with more forest, and a small, separate island is visible in the distance. The sky is a clear, deep blue. The overall scene is a beautiful representation of a tropical coastal environment.

# Small Islands, Big Stakes





M

ANY SMALL ISLAND DEVELOPING STATES ARE THE CUSTODIANS OF HUGE MARINE TERRITORIES WITH RESOURCES AND BIODIVERSITY OF SIGNIFICANT GLOBAL VALUE. DESPITE THESE VAST FISHERIES AND MINERAL RESOURCES, MANY SMALL ISLAND NATIONS SIMPLY LACK THE TECHNOLOGY AND CAPACITY TO DEVELOP THEIR OCEAN RESOURCES.

MANY SMALL ISLAND NATIONS ALSO SHARE SIMILAR SUSTAINABLE DEVELOPMENT CHALLENGES SUCH AS RAPIDLY GROWING POPULATIONS, LIMITED RESOURCES, AND FRAGILE ENVIRONMENTS. THE DISCHARGE OF UNTREATED WASTEWATER INTO COASTAL WATERS HAS CONTRIBUTED SIGNIFICANT DAMAGE TO THEIR COASTAL ECOSYSTEMS AND CORAL REEFS. THE RESILIENCE OF MANY FRAGILE ISLAND ECOSYSTEMS IS NOW ALSO THREATENED BY CLIMATE CHANGE, PARTICULARLY IN LOW-LYING ATOLL NATIONS WHERE SEA-LEVEL RISE AND EXTREME WEATHER EVENTS ARE PUTTING COASTAL AND FRESHWATER RESOURCES UNDER EVEN GREATER STRESS.

AS A RESULT OF THE BARBADOS PROGRAMME OF ACTION, MANY SMALL ISLAND DEVELOPING STATES HAVE MADE SIGNIFICANT PROGRESS IN DEALING WITH ISSUES SUCH AS THE MANAGEMENT OF SOLID WASTE. HOWEVER, MANY STILL LACK THE SYSTEMS AND THE TECHNICAL SUPPORT THEY NEED TO EFFECTIVELY MANAGE THEIR VITAL COASTAL AND WATERSHED RESOURCES. THE GEF INTERNATIONAL WATERS PORTFOLIO IS NOW WORKING WITH ISLAND NATIONS IN THE PACIFIC AND THE CARIBBEAN TO FOSTER GREATER COMMUNITY PARTICIPATION IN THE DEVELOPMENT OF PRACTICAL AND COST-EFFECTIVE SOLUTIONS TO PROBLEMS SUCH AS POLLUTION FROM UNTREATED WASTEWATER.

## STRENGTHENING COMMUNITY-BASED MANAGEMENT IN THE PACIFIC ISLANDS

The Pacific International Waters Project (IWP) was designed to help government agencies find cost-effective ways to strengthen the community-based management of waste, freshwater, and near-shore fisheries. The project worked with selected pilot communities to understand the root causes of resource management problems and to identify possible low-cost solutions that could also help countries improve planning and policy development at the national level.

Asterio Takesy, Director of the Pacific Regional Environmental Programme (SPREP), says the project played a crucial role in helping to promote greater community understanding and ownership of critical environmental issues throughout the region.

“The Pacific IWP was not about directly funding infrastructure such as wastewater treatment

*“When I did the composting from the kitchen waste it was only after people actually saw the big, healthy eggplant that they actually realized there was something to it. It really is a case of ‘seeing is believing’.”*

Pita Vatucawaqa, the Chair of the Village Environment Committee

plants or landfills. It was about helping communities to understand the root causes of their problems so they could develop their own cost-effective management solutions that could then be supported and replicated on a larger scale,” he says.

Eight of the participating countries (Kiribati, Palau, the Marshall Islands, Tonga, Fiji, Nauru, Papua New Guinea, and Tuvalu) chose to focus on the management of solid and liquid waste as their priority environmental concern. The Cook Islands and Samoa focused on the development of community-based management programmes to protect important watershed areas from the impacts of livestock and human activities.

In Tuvalu, the work of the IWP was critical in supporting the development of an integrated water resource management plan for the entire country. National agencies were prompted to collaborate when project surveys found that most household septic systems were leaking directly into their shallow groundwater and lagoon system. The country is now assessing plans to support the introduction of waterless technology such as composting toilets.



Pita Vatucawaqa, the Chair of the Village Environment Committee, and Peace Corps Volunteer Mary Ackley worked together to build the village's first composting toilet.

In Fiji, the IWP worked with the village of Yunisinu to develop a waste management system that includes composting kitchen, human, and animal waste. Pita Vatucawaqa, the Chair of the Village Environment Committee, says he became inspired to act after an IWP workshop helped him to understand the connections between the village waste and their declining marine resources.

“It was only when we went on a field trip to see the dying coral reef that I realized that the depletion of our fisheries is also caused by leaks from our toilets, waste from piggeries, and our gray water,” he says.

Implementation of the Strategic Action Programme of the Pacific Small Island Developing States (SIDS)

Agency  
UNDP

GEF grant  
12.3 million

Co-financing  
8.1 million

Countries  
Cook Islands, Fiji, Kiribati, Marshall Islands, Micronesia, Nauru, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu

Website  
<http://www.sprep.org/>

Vunisinu is a low-lying rural village just a 45-minute drive from Fiji's capital Suva. Because of constant flooding, Pita says he had to relocate the family's pit toilet more than 10 times over the last 10 years. This was one of the main reasons that prompted him to install the village's first composting toilet at his home.

Because of project champions like Pita, nearly all the households in Vunisinu are composting their green waste, and the villagers no longer use mangroves and riverbanks as dumping grounds.

"When I did the composting from the kitchen waste it was only after people actually saw the big, healthy eggplant that they actually realized there was something to it. It really is a case of 'seeing is believing'." That is the main mountain that we have to move," he says.

Pita became such an enthusiast about the benefits of composting toilets that he was interviewed by radio and TV stations from Fiji and throughout the Pacific. His enthusiasm helped to communicate a possible solution to thousands of people facing similar problems with coastal pollution right across the Pacific.

## STRENGTHENING INTEGRATED WATER RESOURCES MANAGEMENT IN THE PACIFIC ISLANDS

The Pacific Islands Applied Geoscience Commission (SOPAC) is now supporting the development of the GEF-funded "Pacific Integrated Water Resources Management Project" from its headquarters in Suva, Fiji. This new regional project is designed to help countries bring together government departments, NGOs, communities, and the private sector to coordinate and combine their water management efforts.

SOPAC Director, Cristelle Pratt, emphasizes that the project design has been driven by the participating island countries from the very beginning.

"The GEF Pacific IWRM has had a long gestation period, but this has been very important for the success and sustainability of the project. The demonstration projects originated from IWRM Diagnostic Reports and Hotspot Analyses undertaken by each of the 14 Pacific Island countries. Each country then developed a demonstration project based on their self-assessment. In my experience this is a unique approach for the region and it has ensured that capacity has been developed and real ownership of each project now exists within each Pacific Island country. IWRM must be driven from within each country if it is to become the new "Pacific way" to manage water," she says.

All participating countries have started the work of addressing their priority concerns. Fiji has begun work on an integrated flood risk management blueprint for the flood-prone Nadi River Basin. The Cook Islands has started to develop an integrated freshwater and coastal management plan for Rarotonga. And Niue, the Pacific's smallest nation, is developing a model of integrated land use, water supply, and wastewater management for its capital, Alofi.

Tuiloma Neroni Slade, the Secretary General of the Pacific Islands Forum Secretariat, was closely involved with the initial development of the Pacific IWRM when he was Samoa's Permanent Representative and Ambassador to the United Nations, and a serving member of the GEF Executive Council. He is pleased the project will support a much greater emphasis on monitoring and collecting water related data throughout the Pacific Island countries.

"SOPAC is working with countries to put a lot of emphasis on collecting, monitoring, and evaluating vital data and that is absolutely essential. We need to understand our hydrological systems before we can develop appropriate management systems," he says.



## INTEGRATING THE MANAGEMENT OF WATERSHED AND COASTAL AREAS IN THE CARIBBEAN

In the Caribbean the Integrating Watershed and Coastal Areas Management (IWCAM) project is helping the participating countries to implement an integrated approach to the management of watersheds and coastal areas.

A major component of the project is the development and delivery of nine demonstration projects in the areas of water resource management, wastewater treatment, and sustainable land use. In a region where island populations range from fewer than 100 to more than 5 million, the project is working carefully to ensure that any new management approaches are designed to meet the specific needs and resources of different communities.

Ambassador Diann Black-Layne, the former Chief Environment Officer for Antigua & Barbuda, says finding low-cost treatment solution for wastewater is an urgent priority for many communities throughout the Caribbean.

In a region where much of the existing water infrastructure has been in place since colonial times, Ambassador Black-Layne says the total level of investment required to adequately address water and watershed management issues is likely to be in the hundreds of millions. She believes the support provided by the IWCAM could help to create a platform for generating much needed additional investment.

*“Getting community buy-in is extremely important because people in our communities don’t always link their quality of life to issues such as sewage management.”*

Diann Black-Layne, Ambassador for Antigua & Barbuda



Integrating Watershed and Coastal Area Management (IWCAM) in the SIDS of the Caribbean

Agency  
UNEP, UNDP

GEF grant  
14.4 million

Co-financing  
88.2 million

Countries  
Antigua & Barbuda, Bahamas, Barbados,  
Cuba, Dominica, Dominican Rep., Grenada,  
Haiti, Jamaica, St. Lucia, St. Kitts & Nevis,  
St. Vincent & Grenadines & Trinidad & Tobago

Website  
<http://www.iwcam.org/>



“The budget for our demonstration project is just \$560,000, and we have to be realistic about what we can achieve with this level of investment. If we can use this funding to help promote the development of low-tech, low-cost, and easy-to-maintain management systems for sewage, that can be considered a momentous result for the project as well as many countries in the region,” she says.

Ambassador Black-Layne says the IWCAM has also provided the government of Antigua and Barbuda with a timely opportunity to renew its commitment to taking a more integrated approach to watershed management.

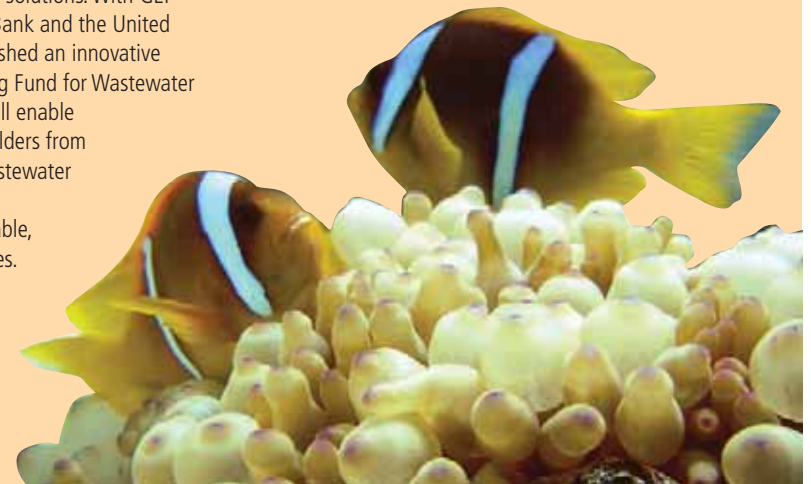
“The IWCAM has really come at the right time for Antigua and Barbuda. With the issue of climate change being so topical, the project has helped us to talk directly with politicians about the importance of preserving the watersheds instead of simply developing them into beautiful upscale houses for non-nationals,” she says

Although the regional focus provided by the project is helping to speed up the decision-making process, she believes it will take a long time for the countries to adopt a more integrated approach to the management of its water issues.

“It will require a different mindset for the different departments to really work with each other towards achieving one goal at the same time. It’s going to be a long process, because really taking an integrated approach will

## A NEW FUND FOR WASTEWATER MANAGEMENT IN THE CARIBBEAN

It is estimated that more than 80 percent of domestic wastewater entering the Caribbean Sea is inadequately treated, a fact that is putting pressure on both public health and coral reefs. Up to now smaller towns and communities have found it difficult to obtain the affordable financing they need to develop appropriate wastewater treatment solutions. With GEF encouragement, the Inter-American Development Bank and the United Nations Environment Programme have now established an innovative financial mechanism called the Caribbean Revolving Fund for Wastewater Management (CRoW). From 2010 this new fund will enable national and local governments, as well as stakeholders from the private sector and civil society, to cofinance wastewater management initiatives. The investments will have to be made in environmentally acceptable, sustainable, and cost-effective wastewater management facilities. The revolving fund means that repayments may be used again to provide funds for new investments in wastewater treatment and management facilities throughout the Caribbean Basin, such as constructed wetlands.



involve re-examining institutional arrangements that have been in place here for the last 200 to 300 years,” she says.

She says the success of the IWCAM should really be measured by the community buy-in it can help to generate for developing practical and cost-effective solutions for problems such as wastewater treatment.

“Getting community buy-in is extremely important because people in our communities don’t always link their quality of life to issues such as sewage management. When a politician comes around lobbying for votes, people don’t usually ask ‘What about my, sewage? They usually say, ‘I want to get a job’,” she says.

## COMMUNITY PARTICIPATION PAYS OFF FOR ST LUCIA'S FOND D'OR WATERSHED

As part of the Fond d'Or IWCAM demonstration project in St Lucia, low-cost technology was installed in more than 20 homes and 10 public institutions to collect and store rainwater from rooftops and other man-made surfaces. The local community regularly suffers from water shortages because existing treatment plants cannot cope with the high turbidity of incoming water supplies. High levels of fecal contamination also mean the 15 communities living in the watershed are at high risk from waterborne disease.

The Fond d'Or Watershed Management Committee is driving the community participation at the heart of the project. The committee, which is made up of community members, government representatives, the water utility, and other key stakeholders, is also helping to build greater awareness and support for a more integrated approach to the management of the entire watershed area.

Cornelius Isaac, the manager of the demonstration project, says there was initially a great deal of anger in the community aimed at the water utility (WASCO), which was seen as the source of water and responsible for all problems related to water.

"Before the project the community did not believe that they had a say or made a contribution to the problem, much less the solutions. The community now feels greater responsibility and realizes that WASCO is just one user of the river and that they can do more to help themselves," he says.

When the rainwater harvesting project began, the committee was careful to select installation sites that would be highly visible to the rest of the community. They were also keen to select people who would be good at educating the wider community about the benefits of the new system and willing to cooperate with the project on household impact studies.

Cooperation agreements were signed with participants, and families were given clear instructions on how to maintain the systems and properly disinfect them using household bleach. Ongoing public education and awareness activities have also included radio and television interviews with project participants like Lucina Shoulette.

Lucina, a householder from the Gardette community, says she could hardly believe her good luck when the project approached her

about installing the system. Although she had collected rain water in drums for many years she says her old system wasn't very reliable and it didn't include disinfection.

Her new system includes guttering to capture the rainwater running off the roof, and PVC piping to channel the water into a 1,000-gallon tank. The water passes through mesh to ensure removal of debris before it enters the tank. Every morning the family manages the "first flush," thereby ensuring that clean water enters the tanks. Instructions for adding chlorine (household bleach) to the tank are followed strictly and the family periodically tests the water using a kit provided by the project.

Lucina believes they will continue to use the rainwater harvesting system even when water mains are finally installed. "Rain water is better (quality) and we will continue to harvest it as shortages may be here from time to time," she says.







The Future Is...Now!





IN THESE TIMES OF GLOBAL CHANGE AND MULTIPLE STRESSES ON WATER RESOURCES, THE GEF HAS RESPONDED TO AN OVERWHELMING NUMBER OF COUNTRY REQUESTS FOR ACTION. THE INTERNATIONAL WATERS FOCAL AREA HAS WORKED PROGRESSIVELY TO CATALYZE MULTISTATE COMMITMENTS TO COLLECTIVE MANAGEMENT OF CROSS-BORDER SURFACE WATER, GROUND WATER, AND MARINE SYSTEMS. THROUGH SPECIAL JOINT PROCESSES PILOTTED BY THE GEF AND ITS AGENCIES TO BUILD TRUST, CONFIDENCE, CAPACITY, AND INSTITUTIONS, 149 OF THE POOREST AND 23 OF THE RICHEST COUNTRIES ON THE PLANET HAVE WORKED TOGETHER COLLECTIVELY TOWARD THE SUSTAINABLE USE, CONSERVATION, AND DEVELOPMENT OF THEIR SHARED WATER SYSTEMS. THROUGH ITS INTERNATIONAL WATERS PROGRAMME THE GEF REMAINS THE WORLD'S LARGEST FINANCIER OF TRANSBOUNDARY WATER COLLABORATION.

For over a decade, experience sharing and learning among projects and among agencies has been a requirement in the GEF International Waters focal area. During this time a partnership among the GEF and its agencies known as GEF IW:LEARN has facilitated cross-project learning and knowledge transfer. As highlighted in the box on page 78 it is now being scaled up in order to better support countries during this time of rapid transition.

The steady depletion and contamination of transboundary surface waters, groundwater, and our coastal oceans has now caught the attention of the world's decision makers. It has taken an astonishing loss of economic and social benefits, threats of conflict, and new worries over climate change to generate a new political imperative for action.

Climatic variability has been long ignored by individual sector development projects, donors and governments, but the changing climate is already here. A good example of this is displayed on page 77 in the global map of Large Marine Ecosystems (LMEs) and their rate of warming over the last 25 years. The warming rates of sea surface temperatures estimated by satellite sensors exceed those reported by the IPCC by two to four times. The coastal oceans are warming much faster than scientists have previously predicted and, with its Global LME



Assessment, the GEF/UNEP International Waters project has made an important contribution in helping the world to understand that the rapid warming of marine ecosystems is an issue that must be addressed now and not tomorrow.

In response to these concerns, new GEF International Waters projects are testing how to incorporate extreme weather events like droughts, floods, coastal storms, and sea-level rise into IWRM for freshwater basins and ICM for coasts. For example, the GEF/UNEP Amazon Basin project includes transboundary concerns about drought conditions experienced during El Niño years. Located just south of the Amazon Basin, the GEF/UNEP Plata Basin project contains a component that will focus on floods and floodplain management during the El Niño years as the Amazon rains move south.

The GEF International Waters focal area is now also concentrating on protecting groundwater systems and their recharge areas because groundwater is the key resource for responding to drought. The water we see in rivers and lakes is just a small percentage of the planet's water, with 96 percent of all freshwater located underground in aquifer systems. In areas that experience more frequent droughts or heavy water use, groundwater resources will be increasingly called upon as an alternative source of water.

New projects, such as the GEF/UNDP Dinaric Karst project in southeastern Europe and the GEF/World Bank SADC groundwater project

in Southern Africa, are focusing on protecting and balancing conflicting uses of this important underground resource. In a dry region of the Mediterranean that is projected to become much drier, the GEF/World Bank Tunisia International Waters project is helping to find ways to take sewage wastewater, provide modest treatment, and then re-use it in irrigation for agriculture.

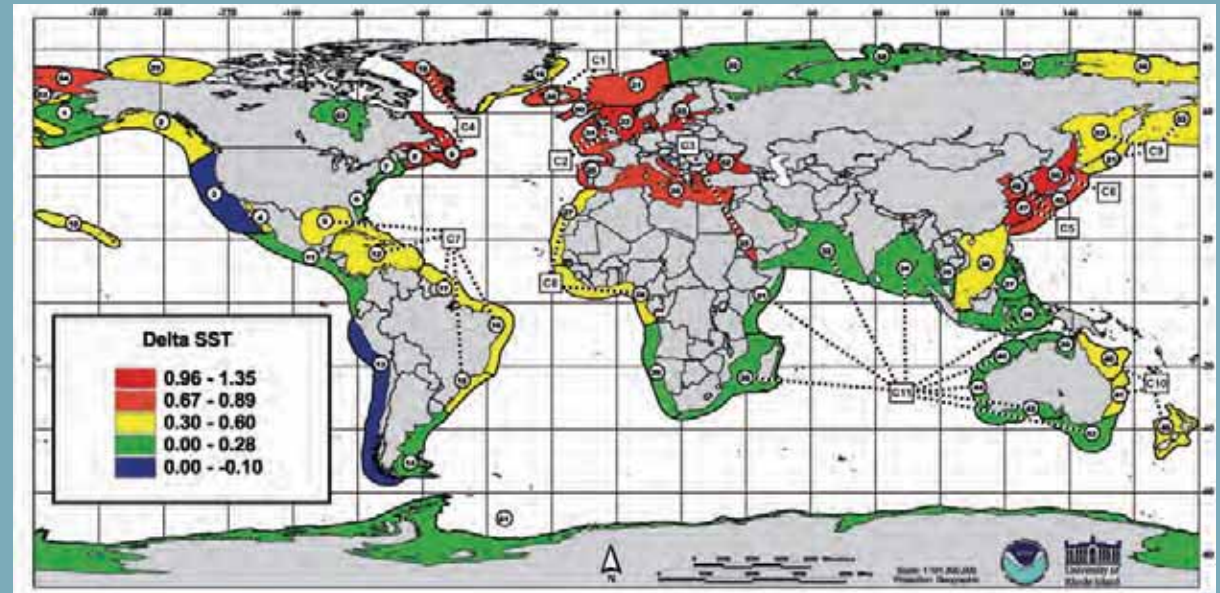
With GEF assistance, many countries have built their capacity to collectively manage cross-border water systems and, in many cases, have already established adaptive management institutions from the regional down to the local scale. To encourage this progress, the GEF will continue to provide support as countries scale up successful demonstration-scale innovations and introduce much needed reforms at the national level.

The GEF works with 10 agencies as development partners and each has distinct comparative advantages. The GEF is centrally positioned as a networking organization to sequence specific assistance to countries through these different agencies to meet country and transboundary water needs. By doing this it can help countries to balance competing water uses, protect invaluable aquifers, and sustain fisheries for food security, livelihoods, and foreign exchange income. The next key step will be to integrate the recently identified stresses from climatic variability — from droughts and floods to sea-level rise and coastal storm vulnerability — into the work of these adaptive management institutions.



In order to meet the challenges of a changing climate, along with all the other causes of conflict and competing uses of water resources, we have a new imperative for action. The GEF now stands ready, with our network of public and private sector stakeholders, to help developing countries take action to secure their water and their environments, and provide real community benefits, from the ridge to the reef.

### SEA SURFACE TEMPERATURE WARMING IN LARGE MARINE SYSTEMS, 1982–2006



#### FAST WARMING:

C1 Northern European Cluster;  
C2 Southern European;  
C3 Semi-Enclosed European Seas;  
C4 of the NW Atlantic; C5 Fast Warming East Asian LMEs; C6 Kuroshio Current and Sea of Japan/East Sea LMEs.

#### MODERATE WARMING:

C7 Western Atlantic LMEs; C8 Eastern Atlantic LMEs; C9 NW Pacific; C10 SW Pacific. Several Non-Clustered, Moderate Warming LMEs are moderate warming: NE Australia, Insular Pacific Hawaiian, Gulf of Alaska, Gulf of California; South China Sea, East Greenland Shelf;

#### SLOW WARMING:

C11 Indian Ocean and Adjacent Waters. Non-clustered, Slow Warming LMEs include the U.S. Northeast Shelf, the U.S. Southeast Shelf, the Barents Sea, East Bering Sea; Patagonian Shelf, Benguela Current and Pacific Central American Coastal LMEs.

Source: UNEP/GEF Large Marine Ecosystems Report, UNEP Regional Seas Report and Studies No.182, 2008.

## IW:LEARN — ENHANCING PROJECT IMPACT THROUGH COLLECTIVE LEARNING

For more than a decade, the GEF and its partner agencies have operated IW:LEARN — the International Waters Learning Exchange and Resource Network. With a total of \$5 billion invested across 183 International Waters projects it is critical for the GEF to find effective ways to share project learning and replicate project successes and impacts on an even larger scale.

IW:LEARN is designed to promote learning and transfer of GEF experiences and knowledge across agencies and projects and regions. It promotes networking, knowledge sharing, and peer learning among stakeholders within and across regions, helping to share best practices and improve the quality of all GEF projects.

Every two years IW:LEARN convenes a conference where participants can exchange practical experiences, share innovations, and engage in a collective learning process with the entire portfolio. After the Fourth Biennial Conference in Cape Town in 2007 participants said the conference helped them discover practical ways to enhance the effectiveness of their own projects.

Visit the IW:LEARN Resource Centre at: [www.iwlearn.net](http://www.iwlearn.net)

## GEF INTERNATIONAL WATERS AND OUR COMMITMENT FOR THE FUTURE

The GEF will continue to utilize the comparative advantages of different agencies to help countries make collective progress on sustaining benefits from their large water systems.

By focusing on the concepts of integrated water resource management (IWRM) and integrated coastal management (ICM), the GEF will provide countries with the best opportunity to achieve the following key benefits:

- Increased food, water, health, and economic security for our communities;
- Sustained provision of goods and services from the water and related land environment;
- Greater regional integration, regional economic development, and regional peace and stability among all collaborating countries.





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## ABOUT THE GEF

The Global Environment Facility (GEF) unites 178 member governments — in partnership with international institutions, nongovernmental organizations, and the private sector — to address global environmental issues. An independent financial organization, the GEF provides grants to developing countries and countries with economies in transition for projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants. These projects benefit the global environment, linking local, national, and global environmental challenges, and promoting sustainable livelihoods.

Established in 1991, the GEF is today the largest funder of projects to improve the global environment. The GEF has allocated \$8.3 billion, supplemented by more than \$33 billion in cofinancing, for more than 2,225 projects in more than 165 developing countries and countries with economies in transition. Through its Small Grants Programme (SGP), the GEF has also made more than 10,000 small grants directly to nongovernmental and community organizations.

The GEF partnership includes 10 agencies: the UN Development Programme; the UN Environment Programme; the World Bank; the UN Food and Agriculture Organization; the UN Industrial Development Organization; the African Development Bank; the Asian Development Bank; the European Bank for Reconstruction and Development; the Inter-American Development Bank; and the International Fund for Agricultural Development. The Scientific and Technical Advisory Panel provides technical and scientific advice on the GEF's policies and projects.



GLOBAL ENVIRONMENT FACILITY  
INVESTING IN OUR PLANET

[www.theGEF.org](http://www.theGEF.org)