

The background is a collage of three images. The top-left image shows a woman in a pink sari crouching on a dirt path next to a blue corrugated metal structure, with a dense urban area in the background. The middle image shows a flooded area with several people standing in the water near small boats and a thatched-roof hut. The bottom image shows a man in a blue dhoti sitting in a small boat on a body of water, with a thatched-roof hut in the background.

# NATURE



# NURTURE

POVERTY AND ENVIRONMENT IN ASIA AND THE PACIFIC

Asian Development Bank





# NATURE + NURTURE

POVERTY AND ENVIRONMENT IN ASIA AND THE PACIFIC

Asian Development Bank

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**O**VERCOMING ENVIRONMENTAL DEGRADATION is necessary if we are to reduce poverty. This is especially true in Asia and the Pacific, where two thirds of the world's poor live. Environmental degradation in the region is pervasive and it is accelerating. People's health and productivity are suffering, natural resource-based livelihoods are being compromised, and vital ecosystem services are at risk. Throughout the region, the poor, especially women and children, are most vulnerable to these worsening environmental trends. Not surprisingly, poor people themselves state that their well being is strongly connected to the quality of their environment—their ability to access natural resources and ecosystems services, their access to safe water and sanitation, exposure to pollutants and hazardous wastes, and likelihood of becoming victims of natural disasters. At the same time, they find it difficult to obtain finance, to market their produce, and to avail of services that could help them contribute to improving their environment.

The relationship between environmental quality and poverty is most obvious in situations where institutions and people are least able to cope and where resources are scarce. It is important, of course, that we attend to important global environmental issues, such as climate change, but we must also pay attention to environmental problems more immediately facing the poor, such as local air and water pollution, desertification, land degradation, loss of biodiversity, and exposure to natural and human-made hazards. There are considerable financial and technical needs to be met before we can overcome environmental problems in Asia and the Pacific. A major need—the one we address in this publication—is to identify and demonstrate replicable and self-sustaining ways to improve the environment that at the same time reduce poverty.

ADB initiated the Poverty and Environment Program (PEP) in 2004, with generous cofinancing from the governments of Norway and Sweden, as a structured learning program on reducing poverty through better environmental management. PEP financed a series of pilot interventions, targeted analytical studies, and information dissemination activities in the following three prioritized areas:

# FOREWORD

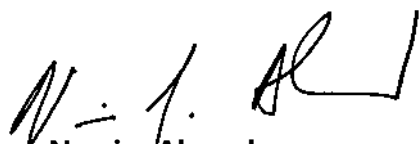




(i) protection, conservation, and sustainable use of natural resources and ecosystem services to maintain the livelihoods of the poor; (ii) reduction of air and water pollution and waste that directly impact the health and productivity of the poor; and (iii) reduction of vulnerability to natural hazards and disaster prevention. PEP's aim is to speed up mainstreaming environmental concerns into the ongoing and future work of ADB and most importantly into development programs in ADB's developing member countries. Making knowledge available to concerned groups, especially about activities with potential to overcome poverty-environment problems, is an important component of PEP. For this purpose a dedicated website ([www.povertyenvironment.net](http://www.povertyenvironment.net)) was established to compile promising practices from around the world.

This publication is one output of PEP. It gives an overview of poverty-environment linkages and features the results of some of the PEP-sponsored activities. It also includes case studies from other organizations. Most of these case studies were discussed at a meeting at ADB in Manila in June 2008 of the Poverty and Environment Partnership, which is an informal network of poverty-environment practitioners from development agencies and nongovernment organizations around the world. The publication captures the key messages that emerged from the discussions.

We hope that the stories described in this publication will inspire and stimulate further action in Asia and the Pacific and beyond, and look forward to working with you to do this.



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**Asian Development Bank**





1

# INTRODUCTION



## Strong Links between Poverty and the Environment

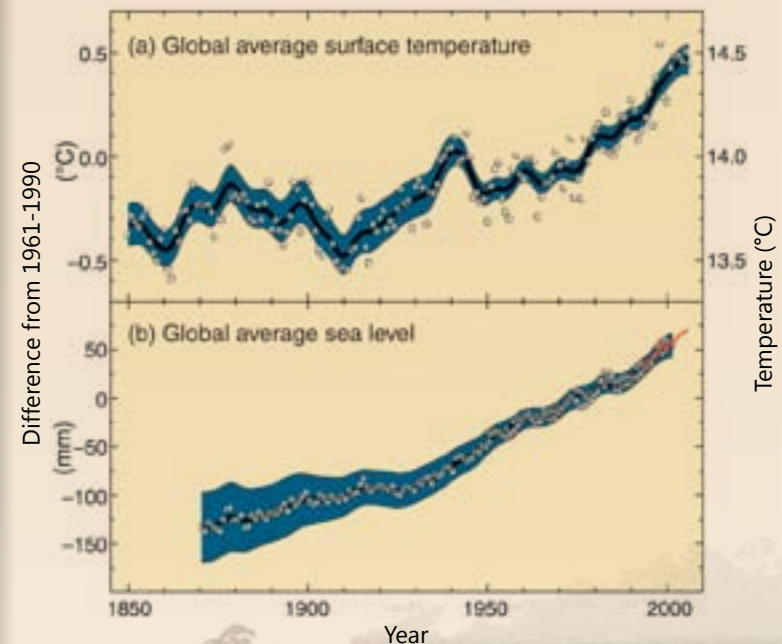
**R**APID ECONOMIC GROWTH in Asia and the Pacific over the past 2–3 decades has lifted more than 150 million people out of abject poverty. In the early years of this remarkable human achievement, environmental concerns were, if not ignored, considered to be less important than development goals. The general attitude was that environmental degradation resulting from fast growth could be reversed once economies were strong and could afford to undertake environmental remediation.

As a result, the region's economic growth has been accompanied by severe environmental degradation in both cities and the countryside—from polluted air, contaminated water, mountains of garbage, and the overpumping of groundwater, to degraded forests and desertification—that is now overwhelming the ability of many governments and communities to respond and undermining development gains.

In addition to these strains, global climate change is adding new long-term environmental hazards in the form of higher temperatures, changing rainfall patterns, rising sea level, and more violent weather (Box 1).

### Box 1: Climate Change

INCREASING TEMPERATURES, rising sea level, and more violent weather that we are now witnessing are the result of increasing human-made production of carbon dioxide and other so-called greenhouse gases, which warm the atmosphere by trapping additional heat from the earth's surface that would otherwise be dissipated into space. The main causes are our rapidly increasing use of fossil fuels for energy, and deforestation and poor land use that have reduced the absorptive capacity for carbon dioxide of plants, forests, and soil. Growth in energy use has been particularly high in Asia; the region accounted for 29% of energy-related carbon dioxide emission in 2005 and is projected to account for 42% by 2030.



Source: [www.ipcc.ch/graphics/graphics/syr/fig1-1.jpg](http://www.ipcc.ch/graphics/graphics/syr/fig1-1.jpg)



Despite rapid economic growth, vast numbers of people throughout Asia and the Pacific remain poor. In 2005, the region was home to about 900 million people living on less than the new international poverty line of \$1.25 a day, and a further 900 million are moderately poor, living on \$1.25–2.00 per day. Thus, 54% of the region's population are extremely or moderately poor.

Beginning in 2007, another factor that threatens to reverse the gains in poverty reduction of the past 3 decades became apparent: sudden and steep rises in the price of staple crops as well as of vegetable oils, soybeans, meat products, and fish (Box 2).

A recent ADB analysis of different types of poverty in the region concluded that environmental poverty, particularly that in drylands and slums, will become the dominant type in the future (Box 3). The problems faced by poor communities that rely directly on natural systems for livelihood and health in the different environments in Asia were recently documented by the International Union for Conservation of Nature (IUCN) and ADB.<sup>4</sup>

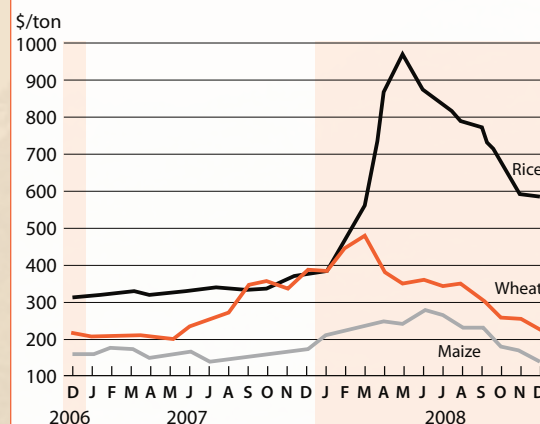
## Box 2: Food Insecurity

In 2008, global food insecurity took center stage when global food prices jumped by more than 50% (see Figure) and food stocks were at their lowest since the early 1980s. Most adversely affected were the 1.2 billion poor people in Asia and the Pacific. More than three quarters of rural and urban poor households are net buyers of food, spending more than 60% of their income on staple food. Food price inflation also severely affected vulnerable groups such as children, the landless, and women-headed households. With no effective social protection systems or measures for reaching the poor and vulnerable people in many Asian and Pacific economies, these people resorted to harmful coping mechanisms, including eating less nutritious food, reducing meals, taking their children (especially girls) out of school, or selling livestock and other assets. According to estimates by the Food and Agriculture Organization (FAO) of the United Nations,<sup>1</sup> Asia and the Pacific recorded the largest increases in the number of undernourished people at the height of the food price surges. An additional 41 million people in the region became malnourished.

In the second half of 2008, international prices of agriculture commodities declined. This however, does not mark the end of the period of food

insecurity for the poor. According to the FAO *Food Outlook*,<sup>2</sup> most of the production increase in the last 2 years was in developed countries. The benefits of higher prices have not reached producers in many developing countries. In fact, higher prices of key agricultural inputs such as fertilizers, seeds, and energy, made it more difficult for poorer farmers to increase production.

### Selected international cereal prices



Note: Prices refer to monthly average. For December 2008, two weeks average.

Source: FAO. 2008. *Crop Prospects and Food Situation No. 5*. December. Rome.



### Box 3: Trends in the Spatial Dimensions of Poverty

THE POOR are those most closely associated with degraded environments. A recent study<sup>3</sup> divides those for whom environment is the main cause of poverty into several spatial groups: dryland poor, those living on arid and desert land areas; flood-affected wetland poor, those in wetland areas who are frequently affected by flooding; upland poor, those living in remote upland or mountainous areas; coastal poor, those living adjacent to coasts and dependent on coastal and/or marine resources; and slum poor, those living in substandard settlements with high exposure to urban pollutants. Many disaster poor, i.e., poor people affected by natural disasters, are also included in these categories.

Projections of future trends of poverty in these groups shows that while overall poverty in Asia and the Pacific will continue to decrease in its income and social dimensions, environmental causes of poverty will become increasingly dominant in future. The proportion of the environmental poor in total poor under the \$1.25/day criterion is estimated to increase from 53% in 2005 to about 70% in 2020, although this proportion of vulnerable poor (under the \$2/day poverty line) will decrease from 85% to 62%. The changes vary among the different groups. The proportion of slum poor, for example, will increase from 12% to 25% of total poverty.





## Need for Local Action

Much effort to slow down or reverse environmental degradation has been made in recent years by governments, international development agencies, civil society, and the private sector.

However, most of these efforts have been top down—initiated by central governments, with limited benefit to the poor. Similarly, poverty reduction has been addressed mainly through broad economic development efforts whose effects take time to reach the poor.

Such measures do not deal with the “here and now” of poverty or degraded environments. For this, local immediate action is needed, based on community demands and with community participation.

The impact of local actions is faster and properly designed projects can be replicated and spread. Such projects can also become guideposts to improve policies, pointing ways to achieve national poverty reduction and environmental conservation.

## Structure of the Publication

To improve coordination and collaboration among those working on poverty reduction and the environment, an informal network of practitioners, the Poverty and Environment Partnership, was established in 2001 (Box 4). At its 13<sup>th</sup> meeting in June 2008, the partnership held a special session on experiences with local interventions, including a number of projects carried out through the ADB Poverty and Environment Program (Appendix 1). The purpose was to highlight the successes and their potential for scaling-up, as well as to describe the constraints and lessons derived from the experiences.

This publication provides an overview of poverty-environment interactions and presents some of these case studies and others that show how poor communities in Asia and the Pacific have sought to break out of poverty through local actions that improved their environment or made them less vulnerable to environmental stress.

To illustrate these poverty-environment links and approaches to address them, we divide the environmental poor into three groups:

- those who depend to a significant extent on the natural resources and ecosystem services provided by forests, drylands, uplands, wetlands, and coasts;
- those in urban areas, who suffer more than others from the impacts of industrial and municipal waste pollution of the air and water, inappropriate solid waste disposal and inadequate sanitation; and
- those who are most vulnerable to human-made and natural disasters, such as chemical spills, earthquakes, volcanic eruptions, tsunamis, floods, fires, landslides, windstorms, sandstorms, and droughts.

The environmental problems faced by each group are outlined and examples of successful local actions are given. These are followed by a summary of the main lessons drawn from the case studies by groups of experts at the 13<sup>th</sup> Poverty and Environment Partnership

meeting special session. The publication concludes with a reflection on the broader role of society in resolving environmental problems associated with economic development.

#### Box 4: Poverty and Environment Partnership

THE POVERTY AND ENVIRONMENT PARTNERSHIP IS an informal network of practitioners from development agencies and nongovernment organizations working on poverty reduction and the environment.

The objectives of the partnership are to build consensus on the critical links between poverty and the environment, including the better environmental management essential to lasting poverty reduction; and to review the activities of development agencies to build on common themes and address gaps in knowledge.

There are three broad areas of collaboration: knowledge management and exchange of expertise and information; conceptual and analytical work; and wider communication, advocacy, policy dialogue, and alliances to influence discussion and political decision making. The partnership is open to membership by interested organizations.



■ Deliberations at the 13<sup>th</sup> Poverty and Environment Partnership meeting, ADB Headquarters, June 2008



# 2 SUSTAINING NATURAL RESOURCES + REDUCING POVERTY

**I**n Asia and the Pacific, billions of poor people depend on some form of natural resource use for their livelihood and/or survival. They are the small-scale and subsistence fishers, and families in remote areas who depend on wild animal and plant products for most or part of their livelihood, and/or who undertake some form of shifting or permanent small-scale agriculture in marginal lands whether in arid, flood-prone, or remote upland areas.

In the past, their practices were sustainable, in harmony with the regenerative capacity of the surrounding ecosystems. Population growth and movement, and gradual fragmentation and strains on natural systems as a result of the spread of large-scale forestry, agriculture, and fisheries and expansion of human settlements have pushed many who depend on natural systems for their nutrition and livelihoods into poverty.



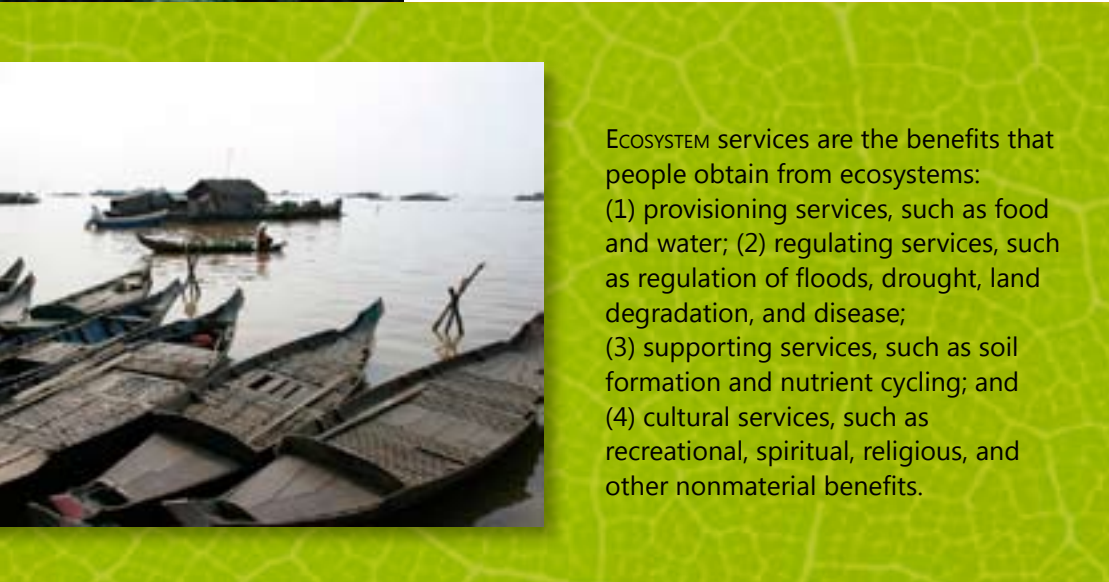




■ Five Flower Lake in Jiuzhaigou Valley, a World Heritage site in Sichuan Province, People's Republic of China



HUMAN USE of natural resources forms a continuum of livelihood activities from hunting, gathering, and animal grazing in relatively intact ecosystems that provide a full range of ecosystem services, to the more intensive use of agroecosystems—ecosystems that have been modified to favor only one or two ecosystem services: food production or plantation products (such as timber and pharmaceuticals).



ECOSYSTEM services are the benefits that people obtain from ecosystems: (1) provisioning services, such as food and water; (2) regulating services, such as regulation of floods, drought, land degradation, and disease; (3) supporting services, such as soil formation and nutrient cycling; and (4) cultural services, such as recreational, spiritual, religious, and other nonmaterial benefits.

When the populations living in forests and coastal areas were small, there was a sustainable relationship between human uses of the natural resources and natural regeneration. However, growing populations, improving living standards, and increasing market demand have led to ever greater pressure on natural systems, such as forests, wetlands, mountain ecosystems, and coral reefs, pushing them beyond their capacity to regenerate, and resulting in their degradation and increasing poverty of local populations who depend on them.

One way to keep ecosystems intact is to close them to nearly all uses, as in national parks and reserves. However, when aquatic

or land areas are declared protected, local, usually poor, communities are generally excluded or given restricted access. Thus, they lose their livelihoods and may seek alternative means of survival that may even increase the stress on surrounding unprotected areas.

In this chapter, we describe case studies of local actions to reduce poverty through improved natural resources management. The case studies involve: i) development of sustainable livelihoods in or near protected areas; ii) community-based reforestation; iii) water resources management; iv) sustainable agriculture through restoring degraded lands; v) renewable energy; vi) creating alternative livelihoods; and vii) payment for ecosystem services.



## Livelihoods in Protected Areas

Protecting some parts of natural ecosystems is necessary on a local scale to provide habitats for animals and plants and ecosystem services for them and surrounding areas. To meet poverty goals, sources of sustainable livelihoods for nearby communities must also be found.

In the Greater Mekong Subregion (GMS), a Biodiversity Conservation Corridor Initiative is setting up corridors of carefully managed forests and agro-forests between the national parks and other protected areas across the subregion, to ensure that the movements of animals like elephants and tigers that need large areas of contiguous habitat, are not adversely affected by “economic corridors” in which economic development is taking place.

Through local action, one such corridor was set up in Viet Nam that also provides benefits to the poor (Box 5). This pilot activity generates data and experience that will be used to implement the wider Biodiversity Conservation Corridor Initiative and biodiversity conservation activities under ADB’s Forest for Livelihood Improvement in the Central Highlands project. Understanding the constraints, such as capacity limitations, data gaps, and institutional weaknesses, is very important to the success of such activities. The benefits from this local action will flow to provincial, national, and regional levels.

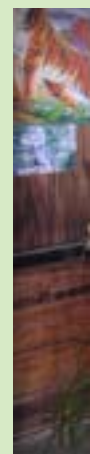
### Box 5: Poverty Reduction and Conservation Corridors in Viet Nam

IN LAM DONG PROVINCE of Viet Nam, there are several protected areas of forest. To enhance conservation objectives a corridor of additional protected land was needed between two of them—Bi Doup-Nui Ba National Park and the Da Nhim protection forest—to allow for the movements of large animals. The establishment of the conservation corridor provided an opportunity to help the poor in the area as well as meet the conservation objective. The proposed conservation corridor spanned an area utilized by three communes Da Sar, Da Nhim and da Chais. These communes were composed mainly of ethnic minorities whose livelihoods were based on shifting cultivation and tree crops like coffee and fruits.

The People’s Committee of Lam Dong Province established a special management unit comprised of staff from several government departments to identify a corridor area, help commune residents find a way to protect it, and provide them with new livelihoods, focusing on the poor.

The villagers took part in identifying a corridor and in making forest protection regulations. They stopped further damage of the area and were compensated by assistance and training to develop forestry, agriculture, and animal husbandry livelihoods. The villagers also decided how to identify the beneficiaries. They established a revolving stock of cattle called the “cow bank” and ways to share the benefits, and identified their training needs.

Participation of the villagers in the project enabled clear understanding of the objective among both them and project staff; it also helped establish trust between them, and created a sense of ownership and responsibility.







■ CLOCKWISE FROM TOP: Villagers, including women, took part in baseline biological diversity surveys.

Several hectares of valuable tree species were planted in degraded areas and plantations in several further hectares were improved.

Large animals like the Indochinese tiger and Malayan sun bear need large habitats for their survival.

Part of the protected area

Orchid production was found to be a successful livelihood for some.





All maritime Asian countries have some type of protected or closed areas in their fisheries management regimes. These “no-take” areas are known to result in increased fish catches in adjacent sites, but reports on socioeconomic benefits are scarce. A study of four marine protected areas in Asia and the Pacific showed clear, local benefits through increased catches, new jobs, better local governance, and better health. The study concluded that networks of small protected areas offered the best potential for poverty reduction among coastal communities (Box 6).

#### Box 6: Benefits of Marine Protected Areas

OVERFISHING, mainly due to population pressure, has caused steep declines in tropical, inshore fish catches and increasing poverty of fishing communities. Poor fishers often use destructive fishing methods, such as use of explosives or poisons, which is worsening this decline. Difficulty in enforcing regulations has led many managers to conclude that marine protected areas (MPAs) are the most practical and efficient way to offset this decline. Many have been set up but studies of their income and nonincome benefits are few.

The Nature Conservancy, working with local nongovernment organizations, studied 4 MPAs in Fiji, Indonesia, Philippines, and Solomon Islands, and showed that there were clear poverty reduction benefits at low cost, such as through tourism. For example, the Fijian MPA (Navakavu) cost less than \$12,000 over the 5 years since start up, and helped to double the incomes of about 600 people. As a result, more than 120 new locally managed MPAs have started in Fiji since 2004. The increased revenue can be reinvested for further poverty reduction benefits. For example, in the Philippines site (Apo Island), some income from tourism was invested in health care and education.

■ Increased catches are only one benefit of marine protected areas. Revenue from tourism and increased awareness of hygiene also provide benefits to coastal communities.





In Indonesia's Bunaken National Marine Park, the local communities received income from dive tourism and park fees. Also, fishers near the Bunaken MPA spent approximately 50% less time fishing than those in a nearby unprotected area, yet their income was roughly equal.

Improved local governance and marine resources management, leading to improved food security and health, were seen as a result of the Solomon Islands Arnavon Community Marine Conservation Area. Cooperation in conservation activities led to cooperation in other community matters.

The main finding from the MPAs, apart from fulfilling conservation goals, was the importance of community management and sharing of benefits, which extended well beyond income.



## Community-based Reforestation

Reforestation of degraded areas, while restoring the environment to some extent, can also help the poor by increasing the availability of natural resources on which they depend, especially if they are involved in planning and carrying out the reforestation. For example, a local reforestation project in Viet Nam helped communities repair environmental damage caused by the defoliant Agent Orange sprayed on forests in the 1961–1971 war. The communities planned their projected use of new forest products in such a way as to maintain the forest in a sustainable manner (Box 7). The project provides an interesting model of community-based forest management that can be replicated for livelihood improvement in other degraded forest areas, which are common across Asia. This community-based approach was applied in another ADB Forestry Sector Project in Viet Nam.

### Box 7: Reforestation in Viet Nam for Sustainable Forest Product Use

LARGE AREAS of Viet Nam were deforested by Agent Orange sprayed on them during the 1961–1971 war and most areas remain affected. Reforestation efforts have not paid attention to water sources, which are also a health hazard from Agent Orange residues.

In Quang Tri Province, a local project to test a community-based approach to restoring forestland and water resources was carried out in two affected communes, Cam Nghia and Cam Thanh, in Cam Lo District by the People's Committee of Quang Tri Province, under the guidance of the Management Board for Forestry Projects and the Ministry of Natural Resources and Environment.

Villagers were trained in forest management and development planning. They took part in surveys to learn the relationship between forest plantation types and water sources. Some 190 hectares of degraded land were planted to native tree species known to prosper in other Agent-Orange-affected areas.

The villagers made 5-year forest development and management plans according to their identified needs, so they would have sustainable use of forest products for building, cooking, and other domestic needs. Community regulations on forest protection and development for 26 project villages were approved by the district authorities.

Groundwater sources were tested for poisonous compounds. Simple well-water treatment systems were designed and provided to some institutions and families; training in water management, basically to protect the watersheds, was also provided.

The project has resulted in renewed forestlands and a sense of responsibility among the communes for their management. Improved water quality has reduced health risks. Also, village forestry funds have been set up to help generate jobs for villagers.

The success was due largely to close cooperation between government and villagers. However, in replicating and scaling-up the project in other areas, integration of the forest and water aspects is crucial in view of the close relationship between forest cover, water resources, and water pollution.





■ CLOCKWISE FROM TOP: Water quality sampling  
Training in water resources management  
Laboratory testing of water samples  
Workshop on forest management



## Water Resources Management

Ecosystem conservation, agricultural production, and human survival itself all depend on reliable water supply. Due to growing population demand, damage to watersheds by deforestation, increasing droughts, changing rainfall patterns, overpumping of groundwater, and pollution of rivers and groundwater, water supplies are not always reliable—particularly for the poor.

Much can be done locally to overcome these problems. In Papua New Guinea, a small project helped villagers deal with contaminated water through community-based water management (Box 8). Creating awareness and knowledge of how to overcome freshwater problems is leading to better health and protection of water resources in this part of Papua New Guinea, and the project has attracted widespread interest around the South Pacific. The education and training approach used will be widely publicized through civil society networks in the subregion and has already been tested successfully in Fiji, Solomon Islands, and Vanuatu. Lessons learned from the project have been put to use in a European Union-funded water and sanitation project in Papua New Guinea.

### Box 8: Community-based Water Management in Papua New Guinea

ON MANY SMALL ISLANDS of West New Britain, Papua New Guinea, land disputes, illegal logging, erosion of small islands, and reduction of groundwater availability have left many villagers with no access to safe water. Gastro-related illnesses are common. A local, community-based water management project was carried out by the nongovernment organization Live and Learn in 16 villages around Kimbe Bay and the Vitu Islands to test the potential for a small-scale, bottom-up approach to the problem.

First, the attitudes of villagers toward water quality were assessed as the basis for a subsequent large-scale education and awareness campaign to safeguard and monitor the quality of drinking water sources. The project helped the community in each village to build and maintain a communal, rainwater harvesting tank. Villagers were trained in the technology—ferro-cement construction, which is relatively easy and inexpensive—and system maintenance.

The results were a sustainable source of drinking water to 302 families in a poor area and education of more than 11,000 people on water and sanitation issues and on how to manage all aspects of their water resources. The villagers who built the water tanks are now competent to train villagers in other communities. One community that received training has since acquired a fiberglass tank mold and the trainees are now building additional ferro-cement tanks in their own community.

The project offered invaluable insights into the time and conditions needed to stimulate communities to act on an important issue; their attitudes to water, which differ from village to village; and the need for strong partnership between communities and government.

- **CLOCKWISE FROM TOP:** Bathing, using a newly installed faucet
- Villagers, (mainly women), need to travel daily to collect water.
- Water tanks were built by villagers after receiving training.
- A large-scale community education campaign was mounted on drinking water, freshwater ecosystems, and sanitation that mobilized schools, churches, women, and village leaders.









## Sustainable Agriculture

Increasing agricultural productivity is an entry point toward both improving incomes and conserving the environment. In the marginal farm lands occupied by the poor, the technology that created the green revolution (new high-yielding staple crop varieties and inorganic fertilizer regimes) does not work. At present, there is emphasis on sustainable or regenerative technologies that either conserve and improve existing on-farm resources like nutrients, water, and soils, or introduce new elements (for example, nitrogen-fixing crops, agroforestry, water-harvesting structures, and predators of pests).

The local benefits in environment restoration and poverty reduction can result in a wildfire-like spread of improved, more sustainable, yet simple agricultural technologies, as shown in examples from the People's Republic of China (PRC) and Nepal (Boxes 9 and 10). Both approaches showed improved ecosystems as well as reduced poverty, and both were widely replicated in their respective countries.

### Box 9: Poverty Benefits of More Sustainable Agriculture, East Gansu, People's Republic of China

EAST GANSU is part of the 51 million hectare dryland area in the northwestern People's Republic of China. Crops yields were low and variable due to irregular rainfall, frequent drought, groundwater shortages, and poor soils. Farmers were poor and parts of the area were heavily reliant on national grain relief.

A local project carried out by the Dryland Farming Institute of the Gansu Academy of Agriculture in the early 1990s demonstrated improved rainwater harvesting methods and water-saving irrigation systems, better crop varieties, and use of fewer nonrenewable inputs. Teams comprised of village leaders, farmers, and researchers spread the information through local training centers. Eventually, some 100,000 farm households adopted these sustainable agriculture techniques on about 70,000 hectares of dryland. Cereal yields increased by about 40%; water availability increased while soil erosion decreased. Fewer pesticides and fertilizers were used. Social capital also increased as farmers worked together on constructing water-saving structures and shared equipment.

The project showed the great willingness of poor farmers to adopt sustainable technologies if they meet farmers' needs and are profitable in terms of food security and income generation. Other important factors included training and extension services, well-defined markets, and farmers' organizations that fostered group activities.

■ Simple technology improvements like rainwater harvesting can transform small-scale agriculture over a wide area.





### Box 10: Regenerative Agriculture in Nepal

PUBLIC FOREST LANDS in the hills of Nepal are being stripped by grazing animals, mainly goats, causing widespread degradation of the forests. A pilot project to rehabilitate the areas while making sustainable use of them was carried out in the early 1990s by several Nepalese government agencies working together.

Small parcels of land with degraded forests were provided to groups of poor households through renewable 40-year leases; 1,773 leasehold groups, comprising 12,028 households, were formed, covering about 7,500 hectares of degraded land. The result was both reduced poverty and reforested hills. Grazing was stopped and pockets of grasses, legumes, and trees were planted. Overall, a more or less natural forest returned over most of the area. Collection time for fodder and fuelwood fell greatly, school attendance improved, and women had more time to take up income-earning activities. Over 10-years, this small pilot project became a national program supported financially by the Government and a growing number of donors, supported by a new leasehold forestry policy.

The project showed how degraded forests can be restored and productive if there is appropriate management, investment, and security of tenure. However, the poor need their own organizations to prevent the elite from undermining their security. Also, forestry and livestock services need to adopt common policies and strategies for conserving forest areas.



■ **CLOCKWISE FROM TOP:** Grazing was banned and forest trees and shrubs were planted.

Edible and fodder crops were also planted in leased lots.

Collection time for fodder was greatly reduced.

Children looking after a hillside garden.



## Renewable Energy

There are many opportunities for the poor to use renewable energy sources—instead of fossil fuels and fuelwood that cause air pollution and greenhouse gas emission—and to benefit through better health and new livelihood options. Most countries have energy policies favoring less reliance on fossil fuels. Local actions, like these micro hydropower examples—upgrading traditional watermills in India (Box 11) and taking advantage of irrigation channels in Indonesia (Box 12)—are showing the way to implement such policies, starting at the local level.

An estimated 250,000 traditional watermills are in use in the Himalayas, mostly in Bhutan, India, Nepal, and Pakistan. Thus, the potential to improve the environment, save costs, and generate income through micro hydropower in this subregion is great. In Indonesia, the Government plans to encourage setting up micro hydropower plants in suitable areas to help meet power needs while reducing reliance on fossil fuels. ADB is considering major investment support to Indonesia's efforts to promote renewable energy based on this model.

### Box 11: Hydropower from Water Mills, Uttarakhand, India

IN UTTARANCHAL in the Indian Himalayas, there are more than 12,000 water mills, traditionally used for grinding grain. Constructed of wood, they need annual repairs and replacement of timber. A state program began in 2002 to replace some parts with longer-lasting metal fittings and to add a turbine to produce electricity. However, it was impractical to attempt to upgrade all the mills scattered across the mountainous state.

A micro-hydropower project was carried out by the Uttarakhand Renewable Energy Development Agency (UREDA) to complement an ADB loan for the Uttarakhand Power Sector Project by providing electricity to poor communities not covered by that project. The micro-hydropower project aimed to develop inexpensive, improved watermills for community use. The technology introduced under the project helped them access electricity for lighting, cooking, and enterprises, while reducing time spent collecting fuelwood. It has also reduced pressure on forests by replacing much of this fuelwood and lessening the need for timber for repairs. The grinding capacity of the new mills is 2-3 times that of the previous models.

One hundred technicians were trained in installation and maintenance to help spread the new watermill design, and associations of watermill owners were formed. Users in the community would share the costs and the project was designed to attract grants to help establish self-sustaining, community-owned activities. UREDA is now planning to upgrade 10,000 mills in the state using the project technology.

The experience from the project helped to form the basis for future renewable energy investments in the country.

■ **UPPER: The new water mills provide up to 5 kilowatts of power.**

**LOWER: A small pipe provides adequate water to drive a water mill.**





### Box 12: Wangan Aji Micro Hydropower Plant, Indonesia

In 2002, the Government of Indonesia established PSK Tersebar, a scheme to promote independent, small-scale power generation plants that can sell electricity to the national grid. The widespread micro-hydropower units were expected to help rural communities by giving them access to a modern, reliable, and clean energy form at affordable costs, thus linking small-scale power generation to poverty reduction.

A community-based micro-hydropower project was carried out in Wangan Aji in Central Java in 2005-2006 by the Indonesian Renewable Energy Cooperative in coordination with a local cooperative and the Directorate General for Electricity and Energy Utilization. The main stakeholder in the project is the local cooperative, which is collectively owned by the community of Wangan Aji and manages and operates the plant. The plant uses run-off water from the community's irrigation channel and is estimated to generate about 970,000 kilowatt hours of electricity annually. After analyzing the local electricity situation and the limited budget for distribution line development, and through consultation with local governments, it was concluded that all the power would be sold to the State Electricity Company (PLN) through PSK Tersebar.

The plant is very profitable, now earning about \$5,000 a month. The revenue from electricity sales is being used to upgrade a school and hospital. A revolving fund is also being set up to manage the net revenue from sale of electricity to implement more renewable energy projects and to support other income-generating activities for the community. ADB is considering a \$30 million loan to Indonesia to promote renewable energy based on this model and adopting similar types of arrangements.



■ **CLOCKWISE FROM TOP:** The water source for the micro-hydropower plant is runoff water from the Wangan Aji irrigation canal.

**Checking the water inlet gate**

**A meeting of the village cooperative of Wangan Aji**

**Turbines in the power plant**



## Alternatives to Livelihoods based on Unsustainable Resource Use

A perennial issue with establishing protected areas is the loss of livelihoods of those who lose part or all their access to their former natural resources. Many interventions have been aimed at training the affected communities in new kinds of economic activity, which does not, however, solve the immediate problem of income loss and often has failed to generate comparable local benefits. With the growing realization of the value of the public good—ecosystem services—foregone by those excluded from protected areas, there is now more interest in jump-starting alternative livelihoods and direct compensation, at least at a local level. A project in the Sanjiang Plain in the People's Republic of China showed ways to ease environmental pressure on declining wetlands while improving farmers' incomes (Box 13). The project experiences are of immediate use for the \$54 million Asian Development Bank (ADB) Sanjiang Plain Wetlands Protection Project and will also serve as basis for new wetland protection projects in the People's Republic of China.

■ Xiaojiahe wetland in Sanjiang Plain, the biggest wetland complex in Asia and home to globally important biological diversity of animals and plants. At issue is protecting wetland reserves while ensuring that communities in the area have sustainable livelihoods.



### Box 13: Sustainable Use of Wetlands, People's Republic of China

THE VAST SANJIANG PLAIN in the northeastern People's Republic of China covers more than 100,000 square kilometers—the largest wetland area in Asia—and has a human population of 9 million. Due to its high rainfall and very fertile soil, the plain has become a national base for grain production. As a result, the wetlands have receded by 80%.

In 2003, the Heilongjiang provincial government issued a regulation on wetland protection, which urged the conversion of marginal farmland back to wetland. Most farmers in these areas are poor. An issue is protecting wetland reserves while providing farmers with sustainable livelihoods. Previous top-down efforts by the county government, such as encouraging geese and cattle raising and mushroom growing, all failed. A bottom-up project undertaken by the Center for Integrated Agricultural Development of China Agricultural University in Raohe, a nationally recognized poor county, sought to develop livelihoods and to make villagers comanagers of the wetland resources.

A participatory needs assessment was carried out and each household made its own choice of alternative livelihoods. Funds for these livelihoods were either grants or loans and a community development revolving fund was set up in the three project villages, Dongxian, Yongfeng, and Sipa. The chosen alternative livelihood activities were diverse, including animal raising, small stores, small restaurants, transportation, and greenhouses for rice seedling production.

The Dajiahe Wetland Reserve was set up at the end of 2004. A comanagement group was established in each project village, and training and manuals on comanagement and natural resources management were provided.

Although not all livelihood ventures have been successful—animal diseases have been a particular problem—the project has shown the bottom-up approach to be far more successful than a top-down one. Overall, the experience has shown the long-term nature of developing new livelihoods, the desirability of government investment in training and market infrastructure, and the need to coordinate wetland and agricultural policies.



■ CLOCKWISE FROM TOP: Herding sheep is one of the livelihood options.

A greenhouse to produce rice seedlings

Meeting to plan a wetland reserve administration unit



## Payment for Ecosystem Services

A new way to finance environmental conservation with poverty reduction benefits is payment for ecosystem services (PES), a variety of arrangements through which those who benefit from particular ecosystem services pay back those who manage the natural systems that provide these services.

In Cambodia, the nongovernment organization Conservation International helped a community to protect an important protected forest area. The community has received substantial continuous benefits in food security, education, and income in return (Box 14).

In Ecuador, the Government followed up a similar successful project by Conservation International in a protected area by setting up a national fund for conservation payments.

The PES arrangement in the Cambodia case included a biodiversity conservation objective. The most common applications, however, have been for watershed protection, where downstream water companies pay upstream residents to protect their forest resources.

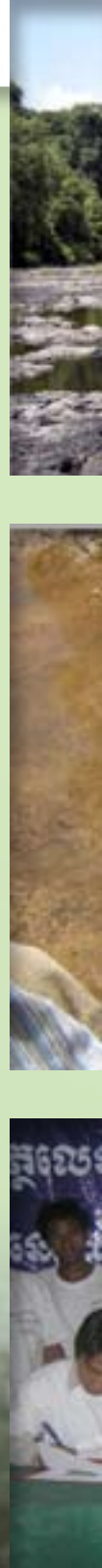
Another important emerging use of PES is to reduce emissions from deforestation and ecosystem degradation (REDD; Box 15).

### Box 14: Payment for Ecosystem Services, Cambodia

THE CHUMNOAB COMMUNITY in the 400,000 hectare Cardamoms protected forest of Cambodia consists of 73 families, who were destroying some 40 hectares of "protected" forest annually by swidden farming, as well as hunting rare animals. The basic problem was lack of other economic opportunities. A project by Conservation International sought to prevent further destruction of the protected area and help the community to satisfy its needs as identified through the project—food security through rice production, teachers who would remain at the school, and income-earning opportunities. An agreement was reached with the community to demarcate and protect a 20,000 hectare area, in which deforestation and hunting were banned so that the full ecosystem services of the area would be restored. Patrols were set up to enforce the protection.

In payment, Conservation International supported the community's identified needs. As well as wages for conservation activities, the organization provided training in best agricultural practices. It also provided buffalos and agricultural tools. Rice production increased fourfold, teachers were paid to stay for full school years, and school attendance improved. The agricultural training enabled community members to diversify their sources of income.

Annual cost of the Chumnoab agreement is \$30,000. To scale-up the work, a \$2 million trust fund would conserve the entire Cardamoms protected area into perpetuity. To conserve all Cambodia's nominally protected areas could cost \$75 million per year, the bulk of which could come from emerging international funds related to reducing greenhouse gas emissions and for protecting biological diversity.







■ CLOCKWISE FROM TOP: CI reached an agreement with the community to zone, protect, and patrol 20,000 hectares.

Growing new crops

Rice production increased fourfold and school attendance increased because teachers were being paid to stay at the school.

CI provided wages for conservation activities and training in agricultural best practices.

Rare animals, like the Siamese crocodile, were also protected.





#### Box 15: Reduced Emissions from Deforestation and Degradation (REDD)

DEFORESTATION AND SIMILAR TYPES of land degradation account for up to one quarter of all greenhouse gas emissions. Organic matter in forests and soils absorbs carbon dioxide from the atmosphere and plays a critical role in maintaining the earth's carbon dioxide balance. According to the World Conservation Union, tropical forests are expected to be lost at a rate of 5% per decade for the next 30–50 years. Over 1 billion people who live in extreme poverty depend on forests for their livelihoods. Thus, any mechanisms to reduce emissions from deforestation and ecosystem degradation (REDD), such as controlling land-use change and forest use, will have direct economic implications on affected communities. This makes integration of environmental management and poverty reduction a challenge.

Proposed mechanisms for REDD are all based on the idea that developed countries would pay developing countries to reduce rates of deforestation or degradation by implementing a range of policies and projects. By linking these payments to carbon markets (i.e., putting a value on the carbon emissions that are avoided), large sums of money could flow to developing countries. With some estimates exceeding \$30 billion per year, these could dwarf existing aid flows to the forest sector in developing countries. The potential contribution to rural poverty reduction could be immense, but REDD mechanisms may also entail new risks, such as increasing food costs if land is taken out of food production, and capture of benefits by the nonpoor. Integrating REDD policies with wider development strategies is crucial.



# 3 IMPROVING URBAN ENVIRONMENTAL QUALITY + REDUCING POVERTY

The poor in urban areas face a unique set of environmental problems. Here, the poor generally live in the worst conditions, where environmental pollution is greatest—near garbage dumps, factory zones, in flood-prone areas, along polluted waterways, and in “wastelands.”

These crowded slums usually lack access to such basic utilities as sanitation and water supply, worsening already unhealthy conditions. The urban poor also lack access to most natural resources.







■ Urban slums like this one in Manila, Philippines, are often in badly polluted areas.



EFFORTS TO REDUCE URBAN POVERTY while improving the environment focus on reducing air, water, and solid waste pollution, as well as improving access to water supply and sanitation. The greatest impact of environmental quality improvement is generally in better health of communities and especially in improved conditions for women, enabling community members to be more productive to improve their livelihoods and educate their children.

There can also be opportunities for the poor who live and/or work in polluted urban situations to engage in environmental business, such as recycling of materials.

In the following section, we demonstrate local, replicable actions that work: reducing air pollution, remediating industrial water pollution, recycling wastes, and improving water supply and sanitation.



■ Air pollution from traffic affects especially the poor who work on the streets.



## Reducing Air Pollution

Sources of air pollution in cities are many and varied. A principal cause is transport exhaust emissions and one of the main sources in Asia and the Pacific is the two-stroke motorcycle engine, used in private motorbikes and in motorized tricycles for public transport. Some major Asian cities, such as Bangkok, Jakarta, Dhaka, and Kathmandu, are already discouraging the use of motorized tricycles or forcing operators to convert to cleaner engines. A small project in Puerto Princesa, a city in the southern Philippines has shown how straightforward it can be to improve this aspect of urban air quality (Box 16). The “carrot and stick” approach used is suitable for replicating in other Philippines urban areas.

■ Puerto Princesa, a small Philippine city, has won several awards for its environmental stand on development. It has been rated as the “cleanest and greenest” Philippine city and forest cover in the nearby area has increased from 52% to 73% over the past two decades.





## Box 16: Greener Motorcycles for Puerto Princesa, Philippines

IN PUERTO PRINCESA, a city in the southern Philippines, operating motorized tricycles is a popular livelihood—more than 80% of the residents commute on tricycles. However, the tricycles fill the streets with noise and hazardous exhaust gases. They are also a major contributor to traffic congestion.

In 2005, the City Government of Puerto Princesa carried out a project to (i) reduce the air and noise pollution from tricycles by reducing their numbers by 50% and introducing cleaner technologies and practices, such as more efficient engines and preventive maintenance; (ii) develop the livelihood and business skills of the tricycle drivers and operators; and (iii) improve the application of the national Clean Air Act. The project was based on a study in which tricycle operators took part in developing a strategy to overcome the problems. A multipurpose fund was set up to buy cleaner technologies and for training tricycle operators in different livelihoods. Loans from the fund were taken up enthusiastically by the operators and repayments were 94%. Many received training in engine mechanics and in other livelihood areas. Roadside emission testing was institutionalized.

Puerto Princesa's air is cleaner now. However, much will depend on continuation of emission testing and enforcement of standards in the future. The Philippine League of Cities has decided to build its capacity to provide assistance to member cities interested in replicating the project. Thus, the carrot and stick approach used in Puerto Princesa is likely to be repeated elsewhere in the Philippines. Already, the knowledge gained has provided significant input to national policy formulation concerning the tricycle subsector in particular and the transport sector in general.

Some conclusions from the project were that stakeholders' involvement in developing strategies to overcome the problems was important to promote their cooperation, and that coordination and transparency should be maintained at all levels of implementation.

Following the lessons learned from this project, the city is experimenting with electric "plug-in" tricycles and renewable electricity sources to power them.



■ **CLOCKWISE FROM TOP: Tricycles dominate the traffic in Puerto Princesa.**

**Monitoring and roadside testing of air and noise pollution levels against emission standards were developed.**

**Nearly 500 tricycle operators availed themselves of training in maintenance and repair.**

**Tricycle drivers and operators were encouraged to check their vehicles regularly.**





## Remediating Industrial Pollution

Industries dump wastes, often toxic, along waterways or on land that can attract the poor as locations for slums because the poor are the only ones willing to live in these locations. Chemicals can leach into groundwater, contaminating an aquifer over a wide area. The health of poor communities in these areas suffers and they may even be unaware of the source of their illnesses.

India has big problems in this regard, but small-scale local actions are providing inexpensive solutions that can be replicated and scaled-up, as shown in the Blacksmith Institute's work in polluted villages in India (Box 16). Research results from these local actions are shared openly and have become the basis for a \$90 million clean-up funded by the World Bank.





### Box 17: Remediating Industrial Pollution in Poor Communities, India

RIVERS, STREAMS, AND GROUNDWATER SUPPLIES are primary sources of drinking water for most of India's rural poor. Exposure to industrial pollutants in these water sources causes irreversible brain damage in young children; cancers and other chronic illnesses; and impaired ability to correctly absorb nutrients, resulting in severely reduced opportunities for socioeconomic development for millions of people.

The Blacksmith Institute is working with local governments and nongovernment organizations in India to clean up polluted sites that require relatively small-scale efforts and low cost. During 2005–2006, Blacksmith, in collaboration with several agencies in India, carried out a pilot remediation project, in which they made health risk assessments, identified local "champions" to promote the work, discussed the problems with stakeholders, and identified possible solutions. They chose several priority sites as suitable for small-scale remediation.

In Kanpur, Uttar Pradesh, wastes from some 350 tanneries contain a carcinogenic form of chromium, which has contaminated groundwater on which poor residents rely, and has damaged their health. A novel and successful, pilot-scale, groundwater cleaning effort to oxidize the chemical using microbes and render it harmless was undertaken. This "bioremediation" process is inexpensive and has high potential for replication and scaling-up.

Other novel remediation approaches were the use of worm culture to treat soil in a hazardous waste dump in Muthia, Gujarat; bioremediation of lindane (pesticide) contaminated soil in Chinhath, Uttar Pradesh; and inoculation of fungi to reduce heavy metals in fly ash in Panki, Uttar Pradesh.



■ **CLOCKWISE FROM TOP:** Discarded lead battery cases for a backyard recycling business

Diagram of the bioremediation process

Hazardous waste dumped near a village, Gujarat


Industrial pollution coloring a pond pink in Edulabad, Andhra Pradesh

Health effects of chromium poisoning



## Recycling Solid Wastes

Turning wastes back into useful materials is no new concept, but it is one that is demanding more urgent attention as consumers' incomes rise, manufacturers produce more goods to meet increasing demand, and dump sites expand and fill. Opportunities for the poor are many, as the following initiatives in Sri Lanka (Box 18) and the Philippines (Box 19) illustrate. Both approaches are inexpensive, can be widely replicated, and may become even more important in the future as populations and wastes continue to grow.



■ Waste picking for recyclable items at dumps is a significant but hazardous source of income for some urban poor.



### Box 18: Composting in Sri Lanka

IN DEHIWALA MOUNT LAVINIA, near Colombo, Sri Lanka, waste disposal problems are acute. A small community-based project by the municipal council in cooperation with the United Nations Human Settlements Programme to show households how to compost organic waste began in 1999 with just 50 families. The nongovernment organization Sevanatha organized meetings with community-based organizations to explain the project and train householders on garbage separation. Within a year, about half the 1,600 households in the pilot communities were using compost bins and the compost has become an income-generating activity. A commercial recycling center was set up for nonbiodegradable materials and run by the community.

Much of the success of the project was due to a strong federation of local community-based organizations, which attracted support from the Ministry of Housing, nongovernment organizations, and other agencies. The federation also runs the waste collection center as an income-generating activity that has proven sustainable.



■ Sustainable waste collection center in Dehiwala

### Box 19: Manila's Smokey Mountain Area Recycling Scheme

SMOKEY MOUNTAIN was the name given to the former dumpsite for most of the garbage from Metro Manila, Philippines. The dump was closed in 1990. Low-income housing was provided for the wastepicker squatters in the area, but they then had no means of livelihood and continued wastepicking in illegal and dangerous informal areas near the piers.

A project was carried out in 2005–2007 by the nongovernment organization Sustainable Project Management to improve the livelihoods and conditions of the community. Many Philippine government agencies, nongovernment organizations, and the private sector, as well as community cooperatives took part.

Jobs were limited. Thus, the project built on the existing recycling expertise of community members. A lease of land was secured and a new recycling facility built with help from companies that also trained residents to become masons to construct the building. An existing multipurpose cooperative was strengthened and community environmental leaders were trained in waste management. The building and related activities created jobs for about 140 people and an estimated 25% of the villages' household waste is being recycled. The cooperative has begun to show profit for the first time.

Compost production was also found to be a profitable livelihood for the community while related businesses, such as masonry, catering, delivery, and handicrafts from waste were established or expanded.

The success of the project—the first “green” recycling facility in Manila—is further evident in requests from nearby communities to learn about the initiative. Transparency, bridging the gap between the community and government institutions through partnerships, and ensuring that the community made the decisions on project activities were key reasons for this success.



■ **CLOCKWISE FROM TOP:** A new materials recovery facility (MRF) was built next to the closed dumpsite.

A scene at the old materials recovery facility

Sample products made out of recycled materials

Children playing at the Smokey Mountain area

Children waste pickers at the old dumpsite







■ ABOVE AND BELOW: Sorting of wastes near the old dumpsite

RIGHT: Smokey Mountain today

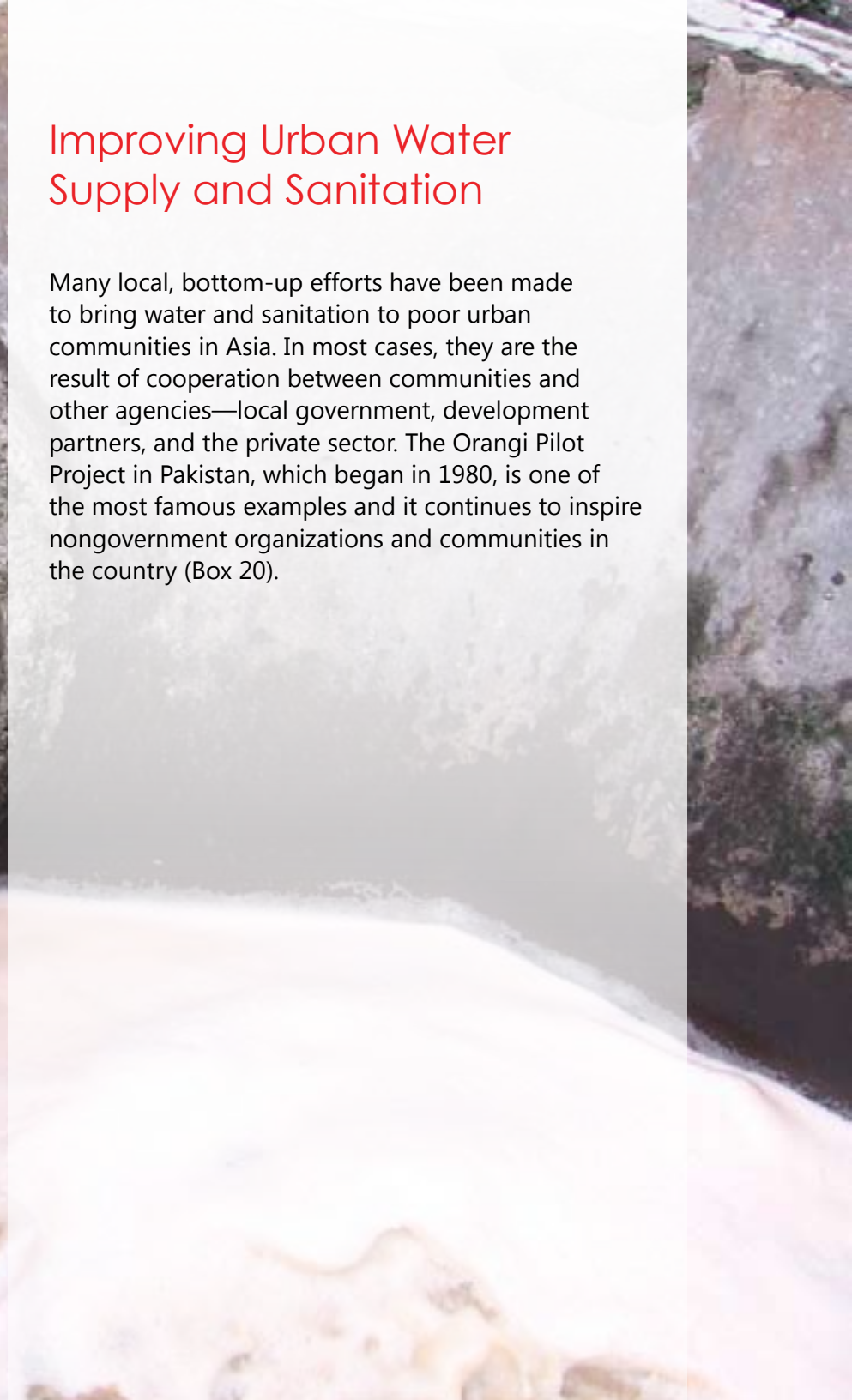






## Improving Urban Water Supply and Sanitation

Many local, bottom-up efforts have been made to bring water and sanitation to poor urban communities in Asia. In most cases, they are the result of cooperation between communities and other agencies—local government, development partners, and the private sector. The Orangi Pilot Project in Pakistan, which began in 1980, is one of the most famous examples and it continues to inspire nongovernment organizations and communities in the country (Box 20).





## Box 20: Community Self-help to Construct Sanitation Systems, Pakistan

In 1980, the Orangi Pilot Project (OPP), a local nongovernment organization (NGO), encouraged the Orangi squatter community on the periphery of Karachi to finance its own sanitation system for the treatment of sewage in the absence of government help. The Government then agreed to build the trunk lines to link the Orangi lines with the main system. The OPP expanded greatly over the years and the model has been replicated in 17 cities and some 50 villages across Pakistan.

For example, in 1999 in an urban area of Lodhran, Pakistan, a local NGO, inspired by OPP, helped communities to finance construction of their own latrines, and this led to cooperation among the community, development partners, and local government to install connections to the main sewage lines. The World Bank and Japan Social Development Fund injected over \$1 million in 2005 to extend the project to 100 more villages with some 20,000 households. Similarly, a community in Faisalabad, Pakistan, led by a local NGO, organized provision of microcredit services for families to buy inexpensive toilet and water supply infrastructure, and this was complemented by the local government's installation of water and sewage pipes. Over several years, 10,000 families benefited from the project.

■ A sewerage water pond in Kasur, Pakistan; Bottom-up approaches to sanitation and water supply have proven successful.







Water utilities in many Asian cities are still unable to provide service to all of the population in the foreseeable future. Small-scale water providers are sharing the role, but their services are costly—generally too high for Asia's poor. Among these providers however, small piped water networks stand out and are increasingly being recognized as an integral part of cities' water development strategies. A small piped water project for communities in Manila, Philippines, brought piped water connections to 1,650 households in 4 months and made possible a 3-year flexible installment scheme for connection charges.

In Tien Giang, Viet Nam, a similar project brought 500 water connections that were installed rapidly and now benefit 2,500 people; in another, in Ahmedabad, India, 124 households benefited with individual pipe connections and 30 toilet facilities.<sup>5</sup> These pilots by ADB all involved communities working with private water operators and point the way to solving water supply problems in many other urban areas of Asia.

■ **LEFT: Small piped water networks in Manila were found to be a successful recipe for bringing affordable water to large numbers of poor households in a short time.**

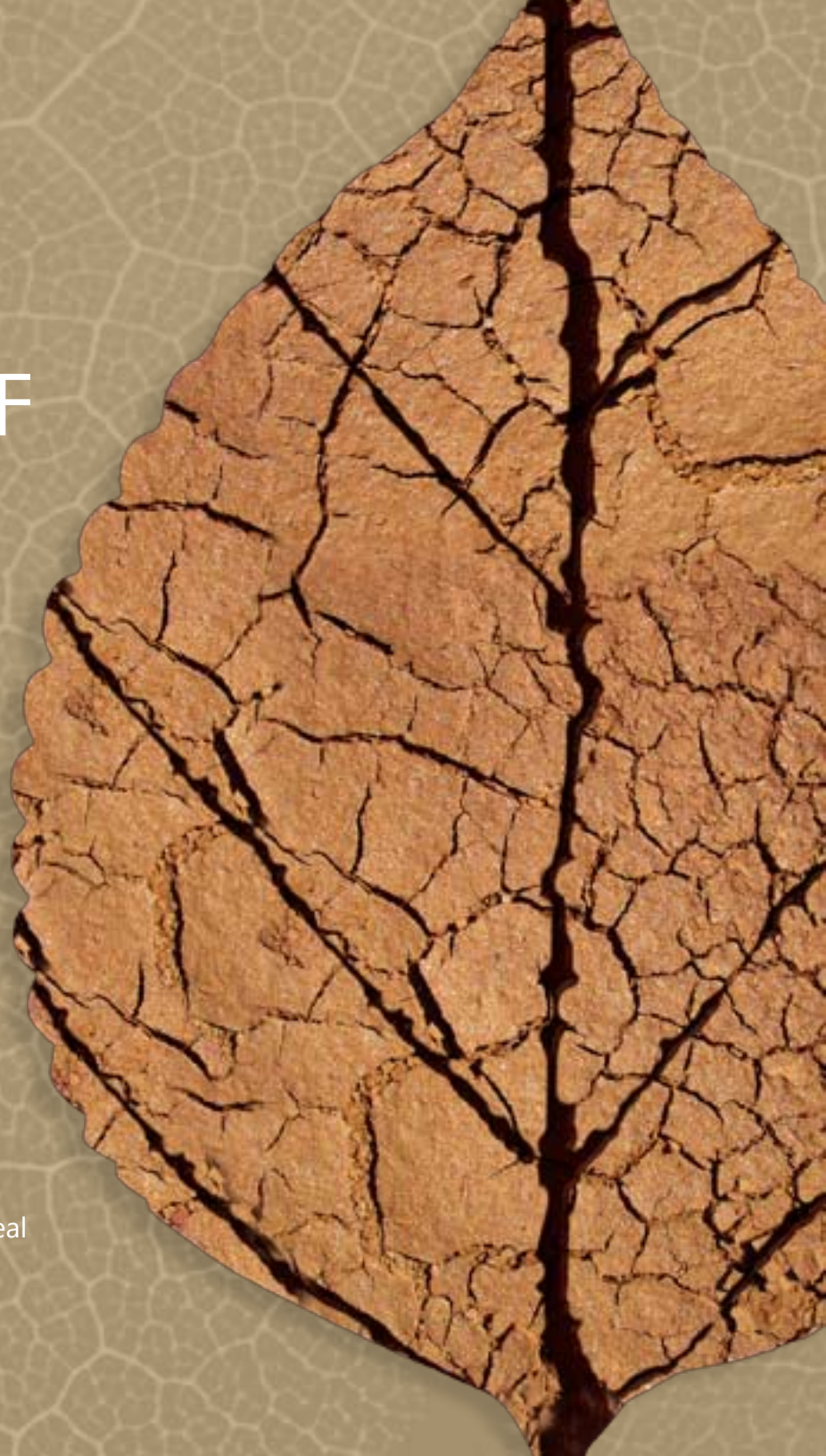


# 4 REDUCING THE ENVIRONMENTAL VULNERABILITY OF THE POOR

Natural disasters—droughts, earthquakes, fires, floods, mud and debris slides, sandstorms, tsunamis, volcanic eruptions, and other generally unpredictable events—generally have the greatest impact on the poorest in society. The poor live close to and depend on forests and coasts, or reside in the harsh environments of drylands and other fragile ecosystems or close to the sources and effects of urban pollution. In short, the poor live in extremely vulnerable conditions.

Annual economic losses from natural disasters average 13.4% of the GDP of developing countries, compared with only 2.5% in developed countries. For Asia, this means an average physical loss equivalent to \$39.5 billion. During 1990–1998, nearly all (94%) of the world's 568 major natural disasters were in developing countries, as were more than 97% of all natural disaster-related deaths.

The global effects and potential impact of climate change on the poor will strain even further the efforts of the region's nations to deal with environmental hazards.







■ Infrastructure damage in Indonesia from the December 2004 tsunami



PERSISTENT AND WIDESPREAD POVERTY and environmental degradation are two of the common factors that can transform a natural hazard into a major disaster, the other common factors being lagging investments in infrastructure and weak governance.

The nature of natural disasters and their effects is changing. Over the past two decades, annual deaths from disasters have fallen 30% globally, although the number of people affected by disaster has increased by more than half. Moreover, the number of recorded disaster events is rising annually, from an average of 150 a year in 1980 to over 450 a year in 2005, partly due to exposed population increase, but mostly attributable to the increasing number and severity of meteorological events. Floods and wind storms have been by far the most common kind of natural disaster during the past century—and they are increasing due to climate change.

The most significant climate change concerns relate to large-scale and sometimes irreversible damage to global life-support systems. A species lost cannot be replaced, and many fragile ecosystems around the world show clear signs of strain—melting glaciers, desertification in Africa and Asia, shrinking tropical rainforests, declining global fisheries, and bleaching of the world's coral reefs.

The Intergovernmental Panel on Climate Change in 2007 stated that around the world, "billions of people face shortages of food and water and increased risk of flooding." A large proportion of these people could become displaced and become environmental "refugees."







## Managing Disaster Risks

Managing disaster risks involves prevention, preparedness, and mitigation. To be widely effective, disaster risk management must devolve to local government units and individual communities, where it can be integrated into normal planning procedures, as illustrated in some high-risk communities in Central Viet Nam (Box 21). In this case, the project affected the design of the ADB Emergency Rehabilitation of Calamity Damage Project in the Central Province of Viet Nam. Also, through cofinancing from the Global Environment Facility, ADB is exploring cost-effective measures to climate-proof coastal infrastructure in Viet Nam based on the experiences from the project (see Box 24).





### Box 21: Disaster Risk Management in Central Viet Nam

THUA THIEN HUE PROVINCE, in the Central region of Viet Nam, is said to be one of the most disaster-prone areas in that country. Its mountains, coastal plains, and lagoons are subject to storms and floods that destroy crops and homes. In the dry season, crops are affected by low rainfall and saltwater intrusion. These occurrences are increasing in frequency and severity in recent years, attributed to climate change.

A project was carried out by the Canadian Centre for International Studies and Cooperation and Kyoto University, in partnership with central and provincial governments and Hue University of Agriculture and Forestry to reduce the vulnerability of a representative, poor agricultural and fishing district (Phu Loc).

Project staff and villagers together mapped the area's vulnerability to natural hazards in terms of income loss and interruption of communications and transport and ways of coping were devised. The result was a community-based approach to managing disaster risk that fitted with existing local planning procedures. "Change agents" from the villages were trained to spread awareness and help communities understand the risks associated with climate change so they could make informed choices to reduce those risks. Each community in the project then developed a "safer community plan" with four elements: improved land-use practices, environmental protection, emergency preparedness, and infrastructure.

This participatory activity has answered socioeconomic needs and contributed to environmental sustainability. How successful the plans will be is a matter for future events to decide. A key element has been close coordination and free information flow between different levels of government, communities, and international partners.

■ **TOP TO BOTTOM: Community-based disaster risk management classes being held for the villagers.**

**Emergency rescue training programs were conducted for selected community members.**

**Pigs for breeding were provided to poor families and a sustainable piggery system was set up, which is managed by the farmers' union.**







■ Flooding in South Asia will be worsened by the effects of climate change.



## Adaptation to Climate Change

The effects of climate change will be particularly acute in South Asia, where the livelihoods of rural communities are closely linked to the seasonal flows of several rivers originating in the Himalayas. Both floods and droughts will increase and the effects will be mainly felt by the poor. Environmentally friendly steps can be taken to adapt to and use the changing landscape caused by river erosion, as in Bangladesh (Box 22), where a very successful local project has benefited more than 60,000 people in its first three years. In recognition, it received the 2007 Ryutaro Hashimoto Asia-Pacific Forum for Environment and Development Gold Award for the quality of environment management, alternative strategies for disaster risk reduction, and sustainable development practices adopted. Similarly, simple technologies were applied in an area of increasing drought in India (Box 23) to reduce poverty and improve the environment, and which can be replicated in many similar situations throughout the subregion.



■ Bangladesh is particularly prone to devastating floods.





### Box 22: Adapting to Disappearing Lands, Bangladesh

BANGLADESH IS HIGHLY FLOOD PRONE. Floodwaters frequently change the course of rivers and streams and during the past two decades, some 7 million people have been displaced when their home and land were washed away by river erosion—with the rate of displacement growing. Once they have lost their assets and livelihoods, these people are forced to live in marginal lands or migrate to cities looking for work; they are the poorest of the poor in the country.

Practical Action Bangladesh, an international nongovernment organization, has been working in a badly affected area in Gaibandha district since 2004 in collaboration with five local nongovernment organizations to reduce the vulnerability of men, women, and children to the physical, social, economic, and political effects of river erosion, flooding, and other natural disasters.



Successful technologies introduced—together with the appropriate training—included innovative agriculture methods and crops for sandbars, embankment slopes, and floating gardens; community-based fisheries management and fish farming in cages, sometimes in combination with duck farming; livestock fattening together with

■ **INSET: Growing crops on previously barred sand bars**



fodder growing and vaccination skills training; and small enterprise development mainly in handicrafts and food processing and their marketing; and in mechanical and light engineering skills.

The project has also established multipurpose refuge shelters, integrated cluster villages to resettle the homeless, nonformal education centers, community clinics, an early warning and rapid evacuation system, volunteer group development, and campaigns on basic health, sanitation, and livestock disease management. Additionally the project has emphasized rights-based training, particularly for women groups on legal rights, child rights, and empowered the target communities to articulate their civil, social, and political rights.

The technologies promoted in the project could benefit millions of displaced or at-risk households in similar situations in Bangladesh alone. Some of the agricultural technologies have been already identified as widely replicable in other developing countries to address food security and poverty issues.

■ **TOP TO BOTTOM: Cage farming of fish is a woman-friendly technology.**

**Floating gardens are a means of survival during floods.**

**Developing handicraft skills**

**River erosion threatens livelihoods.**





### Box 23: Community Adaptation to Drought, India

THE INTENSITY and frequency of drought in Rajasthan have been increasing over the last two decades and are expected to increase even more in the future due to climate change. The Development Alternatives Group carried out a local study in two severely affected villages in Tonk District, which depends on agriculture and animal husbandry. Scarcity of water resulted in massive crop failure in the drought years, reducing incomes, which also prevented children from school attendance and health care.



To cope with drought, farmers stopped growing water-intensive crops like cotton and were storing food grains and fodder. Bunds were placed around fields and ponds were dug or improved, but water scarcity remained.

Through the project, a new medicinal plant using little water and generating significant income was

introduced. Fertilizer use was reduced through composting by worm-culture. Water management was improved through construction of small dams that helped store water and recharge groundwater and wells. Fodder crops were grown widely, benefiting cattle and providing a source of income. Finally, self-help women's groups were formed; each contributed a small amount regularly to be used in emergencies or for community purposes, such as a new well.

The results of the project included availability of drinking water nearly all year round, improved income from new farming practices, better water management, and enhanced food and nutritional security through diversifying agriculture crops.

The successes were due to the presence of a strong local nongovernment organization, and the resulting empowerment of the community. However, additional help from government schemes would be available if villagers were more aware of the schemes, and the application process was less complex. Also, government-funded schemes generally start only after the failure of the monsoon and when damage has already been caused.





The importance of considering climate change and measures to adapt to its effects are highlighted in a current effort to investigate the effects of future sea level rise and drought in Ho Chi Minh City, Viet Nam

(Box 24). There would be damage to infrastructure, while agricultural land would be particularly affected if no adaptation measures are taken.

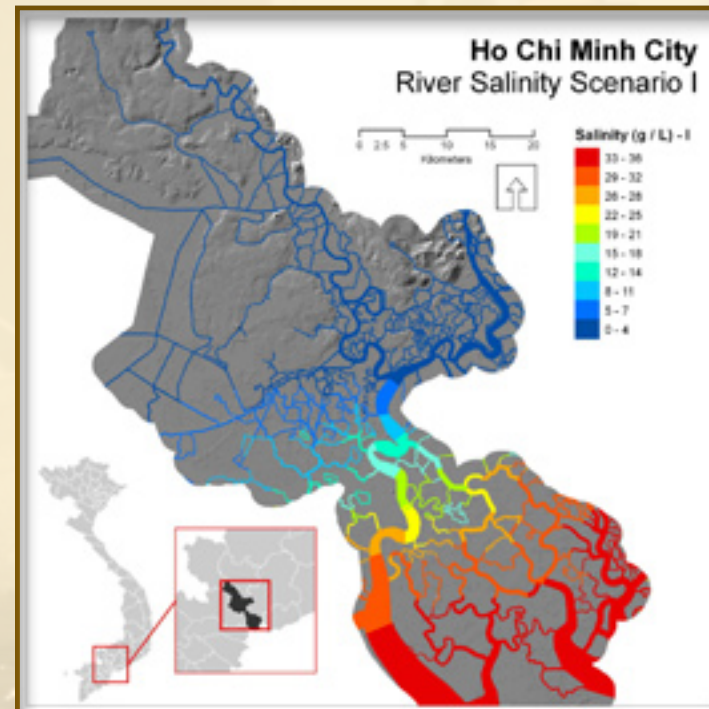
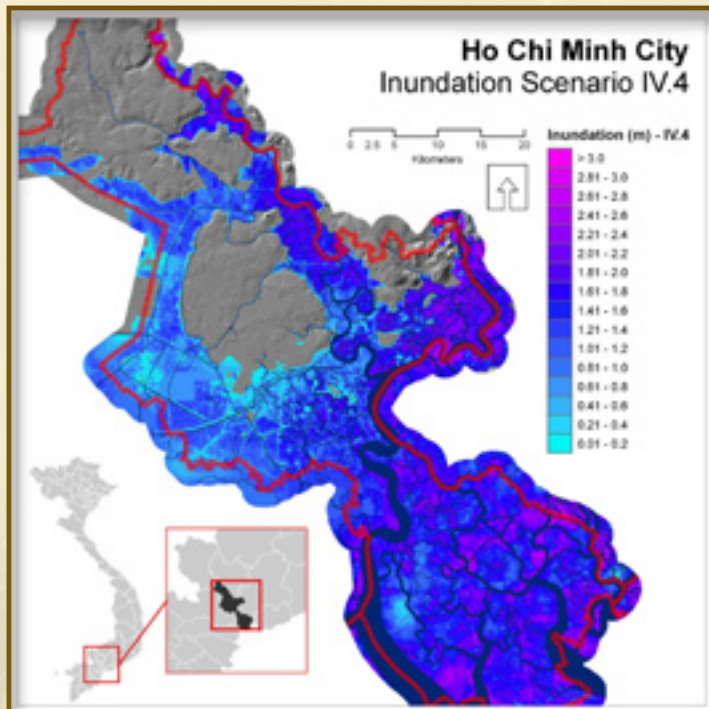
#### Box 24: Climate Change Disaster Risk in Viet Nam

DISASTER RISK from storm surge, flood, and drought resulting from climate change will be significant. A study conducted for Ho Chi Minh City, Viet Nam, as part of a larger investigation on Climate Impact Adaptation and Mitigation in Asian Coastal Mega Cities, has revealed high potential risk from sea level rise. The interim results show that apart from effects on the population and infrastructure from inundation, a significant part of the important agricultural land in the area would

be permanently affected if no adaptation measure is taken. Drought would bring brackishwater conditions far into the Sai Gon-Dong Nai River system and affect agricultural production.

■ **BELOW : LEFT: Inundation effect on the Ho Chi Minh City area of the most extreme sea level rise scenario.**

**RIGHT: Projections of river salinity in the event of severe drought.**





## Equitable Access to Resources

Access to such resources as land, water, and forests, plays a fundamental role in the poverty-environment nexus. While land reform gains have been made over the years in some countries, progress in this area has been undermined by erosion of traditional management institutions in favor of open access to resources or privatization. As a result, the poor, particularly women, have been losing access to natural resources.

Local efforts can help get to the roots of such problems and assist communities to deal with governing institutions, as shown in the case of efforts to improve management of Cambodia's massive Tonle Sap or Great Lake (Box 25). Recognition of inequality of access to the lake's resources led to local efforts to establish a community-based management system, assisted by training of both community representatives and government officers.

### Box 25: Poverty, Environment, and Governance in Tonle Sap, Cambodia

NEARLY HALF the population of about 1 million people who live in the vicinity of Cambodia's Tonle Sap or Great Lake are poor. The lake's natural resources, especially its forests and fisheries, are vital, not only to the communities living on and near the lake, but also the whole country, being a major source of animal protein. However, the natural resource base itself is dwindling as a growing population resorts to unsustainable harvesting of forest and fisheries produce.

Two activities to help local institutions to reduce poverty by managing the lake's resources in an equitable manner were carried out through ADB's Tonle Sap Initiative. In the first project, the Cambodia Development Resource Institute (CDRI) surveyed residents in 24 selected villages in six provinces and found that more and more land was being transferred from the poor to the wealthy. The resulting landlessness of the poor led to the migration of many in search of work, while conflicts over access to the natural resources were escalating. CDRI concluded that with good governance and cooperation, local institutions could function to improve the lives of the poor.

The second project, carried out by the nongovernment organization Community Based Natural Resource Management Learning Institute (CBNRM-LI), helped local as well as national institutions and the lake's communities to prepare community-based management plans by training institution and community members, sharing information at the national level, and creating partnerships among all the stakeholders. More than a thousand people were trained to prepare and carry out community-based management plans. Plans were made by hundreds of communities and these are now being approved by government.

This success was due to a thorough, field-based understanding of the roots of poverty in Tonle Sap; the training needs of stakeholders, especially local institutions; a participatory approach; careful monitoring and evaluation; and a strong partnership between CDRI and CBNRM-LI.

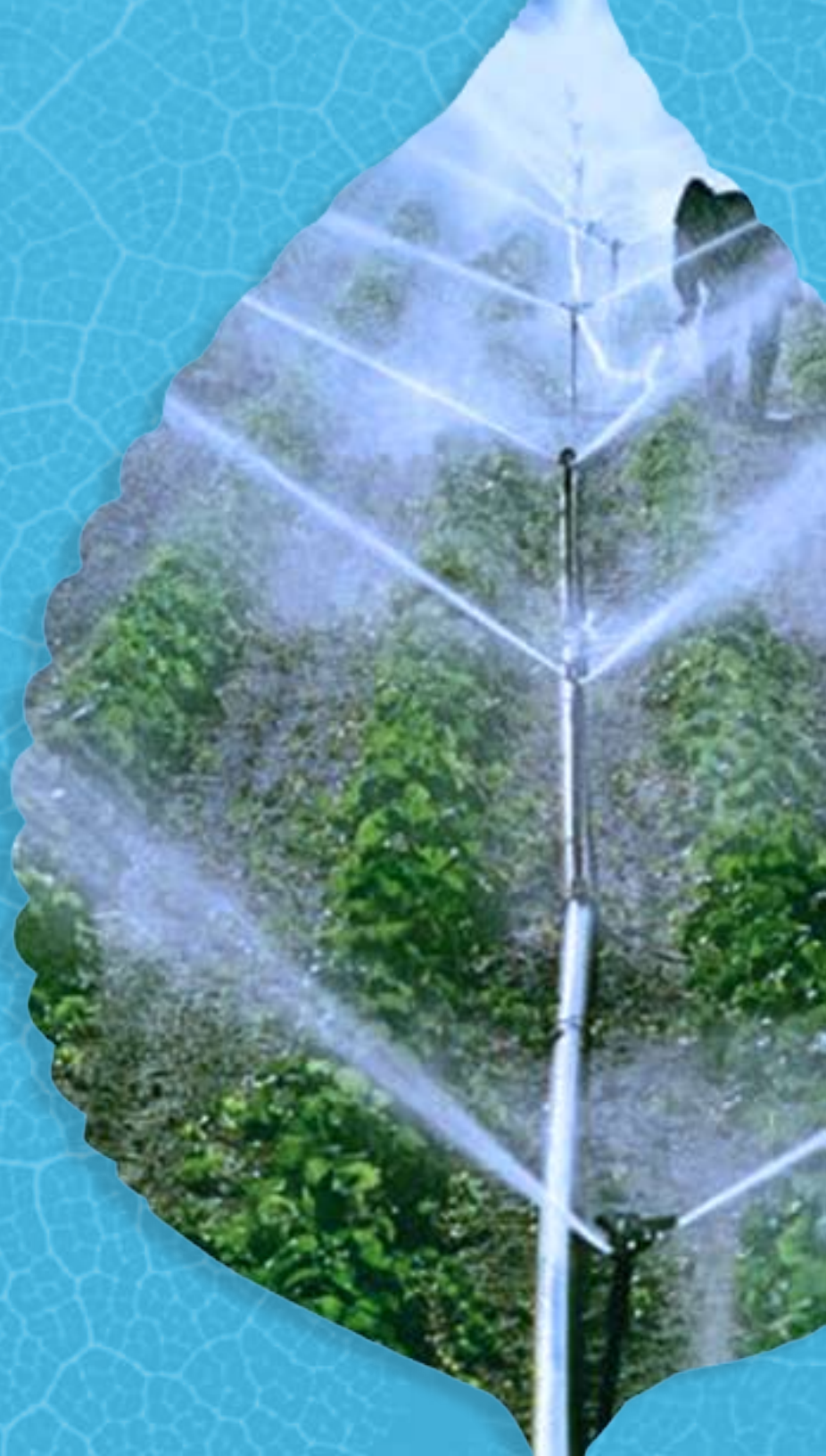
■ Poverty affects some 45% of the population of about 1 million people who live in the vicinity of Cambodia's Tonle Sap or Great Lake.





# 5 LESSONS

**M**ost of the case studies in this publication were carried out with support from the ADB Poverty and Environment Program and were presented at a special session of the 13th meeting of the Poverty and Environment Partnership in Manila in June 2008. Many key lessons were learned from the case studies, as discussed by participants at the meeting. This chapter summarizes the results of these discussions, grouped in the three areas presented in the preceding chapters: sustaining natural resources and reducing poverty, improving urban environmental quality and reducing poverty, and reducing the environmental vulnerability of the poor.







## Sustaining Natural Resources and Poverty Reduction

- ACTION CAN BE TAKEN by a community when faced with issues important to it, often assisted by the special efforts of "champions," influential groups or persons who can help to resolve an issue favorably for the community.
- All stakeholders, that is, all groups that have an interest in particular natural resources, must be included in strategies to manage those resources and related institutional processes to create a sense of broad ownership of the management regime; similarly, stakeholders need to be closely involved in formulating natural resource management projects to ensure that the projects are relevant to their needs.
- Community needs are likely to change over time; project design must be flexible enough to adapt; and generic approaches may not always be effective.
- Projects to improve natural resource management often involve long-term processes, with realistic time and resources allowed for their activities. The time frame must also cater for any training needed to develop the capacities and skills of the stakeholders, such as community members and government personnel, in aspects of sustainable natural resource management.
- It is important to reach a clear understanding among all stakeholders of individual incentives, such as payment for particular ecosystem services in the case of conservation agreements. The activities that will and will not be permitted in the conservation area for which payments will be made, must be clearly defined.





## Urban Environmental Quality and Poverty Reduction

- In assessing project impact, it is important to socially disaggregate data, because overall results can mask important differences among groups. For example, the distribution within a community of income derived from a project is as important as the total amount; and income is but one aspect. The policy and legal framework also has to support replication and scaling-up.
  - The lack of indicators to measure some aspects of impact is a problem in many projects. Absence of measurements can have major impacts on policy. Also, such information is essential for formulating conservation agreements (for example, to determine how much communities will be paid).
  - There is a need to create methods to evaluate longer-term outcomes or that have indirect impact, for example development of eco-tourism and related local businesses in a conservation area.
  - Continuous communication and collaboration with key authorities during the life of a project are necessary. Alliances with Nongovernment Organizations, rural development specialists, and the private sector are also important.
  - Local success can stimulate replication from village to village as well as create national commitment and scaling-up. Local authorities and communities need not wait for national action before adopting potential advantageous poverty-environment solutions.
- Stakeholders at all levels, from villagers to government officers responsible for natural resources management, need to be actively involved in planning and implementing projects and project planning must be based on comprehensive studies that include social issues that affect the communities concerned.
  - Coordination between the public and private sector and clear delineation of responsibilities are important. In particular, local governments need to show strong interest and commitment to undertake replication and make it successful.
  - Strong links between international NGOs and local institutions can be important by bringing together a wide range of experience and skills to find optimal solutions to poverty-environment problems.
  - A project that can be scaled-up at low cost and in a short time has clear advantages.
  - Incentives (income) for those who are to benefit from a project should be tied to clearly identifiable targets and aligned with environmental objectives. Incentives should also take into account the subsidy, cost saving, and legal implications, all of which have a bearing on sustainability of the project.
  - In the case of air pollution, high quality data on air, health, and socioeconomic aspects, as well as qualified and enthusiastic local collaborators, are needed to accurately determine causes and effects on poor communities. This information is also needed to monitor improvements and, thus, to enable replication.



## Reducing the Vulnerability of the Poor and Managing Environmental Risks

- Stakeholder participation is crucial to the planning process. For this purpose local authorities and communities may need training and skills development to enable them to make and implement meaningful plans and decisions related to both industry and the environment.
- Dedicated planning and budgeting are vital, to make efforts related to climate change adaptation and poverty reduction a regular part of government activities. Similarly, ministries of planning and/or finance, not just the ministry of environment, should lead national mainstreaming efforts.
- Economic impact projections (for example, of climate change on the economy) are useful tools to encourage governments at all levels to take action on environmental problems involving the poor and to promote pro-poor growth based on, for example, decreasing their vulnerability to environmental risk and improving their resilience to climate change.
- Integrating activities across all the sectors involved in vulnerability projects is essential. For example to monitor health aspects as well as pollution indicators, such as air and water quality, investigate pollution sources, develop local ordinances, and plan and implement training and education in alternative livelihoods.
- Sustainability of efforts in this field can be maximized by using existing local community and government institutions—instead of creating new, unfamiliar structures that may prove to be unacceptable—and

learning from best practices elsewhere that have been found to balance environmental planning and economic recovery.

Some of the lessons from the case studies were applicable in all types of local interventions. Some of these are the need to involve all stakeholders throughout the project cycle to ensure ownership and relevance and improve the likelihood of successful and sustainable outcomes; and to reach understanding and agreement on incentives for communities and implementing agencies. Some other lessons, while only mentioned with respect to one of the three environmental situations, are applicable to all. Thus, all these observations bear careful scrutiny by organizations planning similar local poverty-environment initiatives.

ADB maintains, on behalf of the informal Poverty and Environment Partnership, a website to serve as an index of poverty-environment knowledge and resources ([www.povertyenvironment.net](http://www.povertyenvironment.net)). More than 1,000 additional case studies and related references can be found on this site.

The ADB Poverty and Environment Program website ([www.adb.org/projects/PEP](http://www.adb.org/projects/PEP)) provides dedicated space for sharing knowledge and lessons to tackle the environmental dimensions of poverty. Interested organizations will find valuable up-to-date information on the website, which also links to members of the Poverty and Environment Partnership and other practitioners from development agencies, international environmental nongovernment organizations, and those working on poverty reduction and the environment. Further information on the Poverty and Environment Program are given in Appendix 1.



6

LOOKING AHEAD







## Next Steps

**A**RMED WITH THE SUCCESSES and lessons drawn from local actions that have reduced poverty while improving degraded environments or reducing vulnerability to hazardous environments, we can and should make use of this experience in addressing the multitude of similar problems that pervade poor communities in the developing world.

First, we need to disseminate information widely about poverty-environment linkages and how local measures can contribute to overcoming problems associated with that nexus. This publication is one such effort. The websites mentioned at the end of the previous chapter are another.

Second, we need to encourage replication of successful local actions to help others take advantage of the initial project experiences and lessons.

Third, we need to develop further demonstration or pilot activities to see how successful actions in one location can be transferred to other locations and situations, and share these experiences also.

Development agencies and governments should take the lead in promoting further local poverty-environment actions by providing funds to disseminate relevant information, to encourage replication and trials of successful projects in different locations, and to scale them up.





## Broader Environmental Concerns

Local actions to simultaneously improve the welfare of the poor and the environment are only part of the solution. At broader levels, much has still to be done, especially at the policy level. Poverty reduction became the main objective of most development efforts in the late 1990s. Environmental concerns per se were often left behind. While the viewpoint of most development agencies now—as illustrated in this publication—is that environmental poverty and environmental degradation can and should be addressed together for the benefit of both the poor and their environment, another view is that “Attempts to reduce poverty will need to be matched with separate environmental management strategies if the goal is to conserve natural resources or services while reducing poverty. Poverty reduction will not necessarily lead to an improved environment unless specific environmental action is taken.”<sup>6</sup>

However, if we are to achieve sustainable development, not only is resolution of poverty and environment concerns necessary. There is a third, closely interlinked, requirement—sustainable production and consumption—as stated in the Plan of Implementation produced by the World Summit on Sustainable Development in 2002. In our efforts to reduce poverty by restoring the environment, we must at the same time make even larger efforts to curb and redress the environmental damage caused by current unsustainable production and consumption patterns.



## Conclusion

This publication has demonstrated the links between poverty and the environment in various situations and shown how local actions can lead to benefits in poverty reduction while simultaneously improving the environment or reducing vulnerability to environmental disasters.

The appeal of such local actions to address urgent or acute problems at the poverty-environment nexus is the immediacy of their impact, their relatively low cost, and their potential for replication and scaling-up. Also, they can be viewed as necessary complements to national and international efforts to curb long-term or chronic poverty and environment concerns. In fact, they may become ready-made mechanisms to implement government strategies and policies in poverty and environment yet to be developed or ratified.

Given the use of local poverty-environment actions not only to solve local problems, but also as underpinning future development strategies, governments at all levels and development agencies should proceed with all haste to replicate successful local actions at the poverty-environment nexus and explore further models to hasten the reduction of poverty and improvement of degraded environments.



## Appendix 1: ADB Poverty and Environment Program

The Poverty and Environment Program (PEP) is a regional technical assistance project and activity financed by the Poverty and Environment Fund, funded by the governments of Norway and Sweden and administered by ADB. The program aims to accelerate learning about poverty-environment linkages and effective approaches for poverty reduction, mainly through financing pilot interventions and analytical studies.

PEP is developing a fast-growing knowledge base that draws lessons from replicable and self-sustaining interventions implemented by ADB and its development partners in Asia and the Pacific and globally.

PEP's focal areas are:

- protection, conservation, and sustainable use of natural resources and ecosystem services;
- reduction of air and water pollution; and
- disaster prevention and reduction of vulnerability to natural hazards.

While capturing knowledge on poverty-environment relationships from experiences of past and ongoing projects of ADB and other development partners, PEP is also acquiring lessons and promoting effective responses toward environmental improvement and poverty reduction through its own small grants program focusing on the following:

- pilot interventions—activities that demonstrate innovative institutional arrangements, participatory approaches, technical solutions, or sustainable livelihoods with clear potential



- for successful replication, mainstreaming, and/or scaling-up and relevant to ADB's ongoing operations in developing member countries;
- targeted analytical studies—focused studies, action research, and targeted activities aimed at removing specific policy, institutional, organizational, technical, and financial barriers to improved environmental management at the local level, including the role of women; and
- information dissemination—activities that focus on the sharing of lessons learned and best practices for addressing the environmental dimensions of poverty and for promoting the key role of women.

## Poverty Environment Net

The Poverty Environment Net website was established as the mechanism for knowledge capture and outreach of the Poverty and Environment Partnership.

Poverty Environment Net is the leading index of poverty-environment knowledge and resources. The website is dedicated to sharing information and lessons gained from the beneficial relationship between environmental management and poverty reduction. It provides examples of good practices and policies, analytical studies, case studies, and related information in more than 1,000 documents and data sources.

These materials are available to the public and are searchable by type, focal area, and geographic region. The site also provides news, special features, and an information exchange forum for specific topics, such as reducing emissions from deforestation and ecosystem degradation.





## Appendix 2: Case Study Sources

**Box 5: Viet Nam Conservation Corridor.** Ikemoto, Nao. 2008. *Pilot Biodiversity Program for Lam Dong Province of Viet Nam*. Presentation at the 13<sup>th</sup> Meeting of the Poverty and Environment Partnership, Manila, 9–11 June.

**Box 6: Marine Protected Areas.** Leisher, C., P. van Beukering, and L. M. Scherl. 2008. *Nature's Investment Bank: How Marine Protected Areas Contribute to Poverty Reduction*. Arlington, Virginia: The Nature Conservancy.

**Box 7: Viet Nam Forest Rehabilitation.** ADB. 2007. *Pilot Rehabilitation of Agent Orange Affected Forestlands in Quang Tri Province of Viet Nam*. Final Consultant Report. Manila.

**Box 8: Papua New Guinea Water Management.** Live and Learn Environmental Education. 2008. *Final Report – Impact and Lessons Learnt. RETA 6150 Innovative Actions for Community-based Water Management and Education*. Kimbe, Papua New Guinea.

**Box 9: People's Republic of China, East Gansu Sustainable Agriculture.** University of Essex, Society and Environment Unit Collaborative Research Programmes. Available: [www.essex.ac.uk/ces/research/susag/safeasia-projects/china/EastGansu.pdf](http://www.essex.ac.uk/ces/research/susag/safeasia-projects/china/EastGansu.pdf)

**Box 10: Nepal, Regenerative Agriculture.** IFAD. 2004. Case study. *Providing the Poor with Secure Access to Land in the Hills of Nepal*. Paper for the Shanghai Poverty Conference – Scaling up Poverty Reduction. Available: [www.ifad.org/events/reducingpoverty/nepal\\_full.pdf](http://www.ifad.org/events/reducingpoverty/nepal_full.pdf)

**Box 11: India, Improved Water Mills.** Uttarakhand Renewable Energy Development Agency. 2008. *Manual for Planning, Construction, Operation and Maintenance of Improved Watermill*. Dehradun, Uttarakhand.

**Box 12: Indonesia, Wangan Aji Hydropower.** ADB. 2007. *Draft Final Report -Wangan Aji Micro Hydro Project*. Manila.

**Box 13: People's Republic of China, Sanjiang Plain Livelihoods** ADB. 2007. *Progress Report for the project of Development of Sustainable Alternative Livelihoods and Community Participation in Sustainable Wetland Management in the Sanjiang Plain*. Manila.

**Box 14: Cambodia Ecosystem Services.** Zurita, Patricia. 2008. *Making Conservation People's Choice*. Presentation at the 13<sup>th</sup> Meeting of the Poverty and Environment Partnership, Manila, 9–11 June.

**Box 16: Philippines, Greener Motorcycles.** Sagun, Jovenee. 2008. *Air and Noise Pollution Reduction Strategies for Tricycle Sub-Sector in Puerto Princesa City*. Presentation at the 13<sup>th</sup> Meeting of the Poverty and Environment Partnership, Manila, 9–11 June.

**Box 17: India Groundwater Pollution Remediation.** Singh, R.K., and M. Mendoza. 2008. *Groundwater Remediation Kanpur, India: A Case Study*. Presentation at the 13<sup>th</sup> Meeting of the Poverty and Environment Partnership, Manila, 9–11 June.

**Box 18: Sri Lanka Composting.** Van Horen, Basil, and Sisira Pinnawala. 2006. Sri Lanka. In *Urbanization and Sustainability in Asia*, edited by Brian Roberts and Trevor Kanaley. Manila: Asian Development Bank and Cities Alliance.



**Box 19: Philippines Smokey Mountain.** Celdran, Anita. 2008. *Smokey Mountain Remediation and Social Development Program*. Presentation at the 13<sup>th</sup> Meeting of the Poverty and Environment Partnership, Manila, 9–11 June.

**Box 20: Community Self-help to Construct Sanitation Systems, Pakistan.** Orangi Pilot Project, [www.oppinstitutions.org](http://www.oppinstitutions.org); Haider, M., and I. Haider. 2006. Pakistan. In *Urbanization and Sustainability in Asia*, edited by Brian Roberts and Trevor Kanaley. Manila: Asian Development Bank and Cities Alliance.

**Box 21: Viet Nam Disaster Risk Management.** McLaughlin, Kathleen. 2008. *Enhancing Human Security, the Environment and Disaster Management: Central Vietnam*. Presentation at the 13<sup>th</sup> Meeting of the Poverty and Environment Partnership, Manila, 9–11 June.

**Box 22: Adapting to Disappearing Lands, Bangladesh.** *Disappearing Lands: Supporting Communities Affected by River Erosion*. Application to APFED Awards for Good Practices by Practical Action Bangladesh, 2007.

**Box 23: Community Adaptation to Drought in Rajasthan, India.** Development Alternatives. *Linking Climate change Adaptation: A Case Study on Successful Community Level Adaptation*. New Delhi. Available: [www.research4development.info/PDF/Outputs/ClimateChange/R8371-india.pdf](http://www.research4development.info/PDF/Outputs/ClimateChange/R8371-india.pdf)

**Box 24: Climate Change Disaster Risk in Viet Nam.** ADB. *Impact of Climate Change on Ho Chi Minh City*. Project Development Phase Status Report. Manila. Draft.

**Box 25: Tonle Sap, Cambodia.** Cambodia Development Resource Institute. 2007. "We Are Living with Worry All the Time" A Participatory Poverty Assessment of the Tonle Sap. Phnom Penh; and ADB. 2008. *Poverty, Natural Resource Management, and the Environment*. NPRS-PRF *Poverty Thematic Paper Series* No. 3. Manila. Draft.

## End Notes

- <sup>1</sup> FAO. 2008a. *The State of Food Insecurity in the World*. Rome: Food and Agriculture Organization of the United Nations.
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- <sup>6</sup> World Bank. 2008. *Poverty and Environment: Understanding Linkages at the Household Level*. Washington, DC.



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## Nature and Nurture: Poverty and Environment in Asia and the Pacific

In recent years, initiatives by the international community to address the links between poverty and environmental degradation have been increasing. These initiatives range from policy reform and top-down approaches to local, bottom-up actions by communities. This publication focuses on local actions, and provides a background to the present situation of increasing environmental poverty and degraded environments. It shows how local actions, with support from governments and development partners, can turn this situation around to reduce poverty and bring about environmental benefits.

These benefits are illustrated through case studies of successful local actions in Asia and the Pacific that can be scaled-up to produce substantial national or regional benefits. Most of the studies are from the Asian Development Bank's Poverty and Environment Program, which promotes targeted environmental interventions that reduce poverty and improve the environment through pilot interventions, analytical studies, and information dissemination.

### About the Asian Development Bank

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries substantially reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to two thirds of the world's poor: 1.8 billion people who live on less than \$2 a day, with 903 million struggling on less than \$1.25 a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

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