

The Tonle Sap Basin Strategy



APRIL 2005

© 2005 Asian Development Bank

This report was prepared by staff and consultants of the Asian Development Bank (ADB). The analyses and assessments contained herein do not necessarily reflect the views of ADB, or its Board of Governors, or the governments its members represent.

ADB does not guarantee the accuracy of the data included in this publication and accepts no responsibility for any consequence of their use.

The term “country,” as used in the context of ADB, refers to a member of ADB and does not imply any view on the part of ADB as to the member’s sovereignty or independent status.

Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
Tel +63 2 632 4444
Fax +63 2 636 2444
www.adb.org

Asian Development Bank. 2005.
The Tonle Sap Basin Strategy.

Publication Stock No. 050105

NOTE: In this report, “\$” refers to US dollars.

This report was prepared by a team consisting of Olivier Serrat (Team Leader), Tatiana Gallego-Lizon, and David Moffatt (Consultant).

Photos by Patrick Mercier

Contents

Executive Summary	ii	Operational Program	28
Map	iv	Core Areas of Intervention	29
Introduction	1	Crosscutting Themes	32
The Poverty-Environment Challenge of the Tonle Sap	4	Financing the Operational Program	33
Poverty and Vulnerability	5	Abbreviations and Glossary	34
Resource Use Management	7	Appendixes	36
Policy, Institutional, and Market Constraints	11	1. The Value of Wetlands	37
ADB's Response	14	2. The Tonle Sap at a Glance	38
Country Strategy and Program	15	3. Causes of Wetland Loss	39
The Tonle Sap Basin Strategy	15	4. Poverty on the Tonle Sap	40
Goal and Development Objectives	16	5. The Needs of the Poor Ranked in Order of Frequency Cited	41
Strategic Principles	17	6. Characteristics and Resources of the Tonle Sap Basin Provinces	42
Delivering the Strategy	20	7. Tonle Sap Catchment Storage Potential	42
Operating Principles	21	8. Operating Framework	43
Activities and Operating Outputs	24	9. Cross-Impact Strategy Matrix	44
The Strategy Matrix	24		
Coordination	25		
ADB's Strengths and Competencies	27		

Executive Summary

The Tonle Sap forms a natural floodplain reservoir in the depression of the Cambodian plain. It is fed by three main perennial and numerous erratic tributaries and is drained by the Tonle Sap River into the Mekong River near Phnom Penh. When the level of the Mekong River is high, the flow of the Tonle Sap River reverses: water is pushed into the lake, raising its level by up to 10 meters and increasing its area from 2,500–3,000 square kilometers in the dry season to 10,000–16,000 square kilometers in the rainy season. This unique hydrological cycle and the vast areas of seasonally flooded low forest and shrubs that it creates in a tropical climate result in a very high biodiversity of fish, reptiles, birds, and mammals, and engender exceptionally productive fisheries. The lake's fisheries directly support more than 1 million people and provide the single largest source of protein for Cambodia's young and increasing population. The flooded areas offer seasonal breeding and nursery grounds and forage areas for fish that subsequently migrate to the Mekong River, thereby providing a regionally vital resource. The lake was nominated as a biosphere reserve in October 1997 under the United Nations Educational, Scientific, and Cultural Organization Man and the Biosphere Program. Its catchments include large areas that have also been designated as globally important in terms of biodiversity, as well as offering potential for the storage of water for irrigation, domestic consumption, and hydropower.

The Tonle Sap basin is under severe pressure, and consumptive use of its resources is intense. Never has the Tonle Sap been called upon to supply so much to so many, yet there are many threats to the lake's ecosystem, including overexploitation of fisheries and wildlife resources, dry-season encroachment, and land clearance of the flooded forest. Degradation of the watersheds' natural vegetation destroys natural habitats and also results in deterioration of water and soil

quality and increased siltation. Despite the lake's inherent richness, most poverty indicators in the basin are even more negative than those that characterize the national population as a whole, and other rural areas of Cambodia. Between 40% and 60% of households in the provinces adjoining the lake are below the official poverty line, with a peak of 80% in some areas. Many households are entirely dependent on fishing and foraging, with access to common property areas often under dispute. Because of the large number of male fatalities during the 1970s and 1980s, there is a disproportionately high level of female-headed households, which are particularly disadvantaged. The lake-dwelling communities also include a significant population of ethnic minorities who, often being excluded from decision making, have less ability to improve their livelihoods. The destruction of the basin's natural resources is



an issue not only of national importance but also has serious transboundary environmental implications. The challenge is to achieve the right balance between production and preservation.

The Asian Development Bank (ADB)'s Tonle Sap Basin Strategy has been formulated in support of the Country Strategy and Program (2005–2007), and forms the basis for setting priorities and planning assistance in the Tonle Sap basin over the next 5–10 years. In the Tonle Sap basin, the development objectives are to foster, promote, and facilitate (i) pro-poor, sustainable economic growth, (ii) access to assets, and (iii) management of natural resources and the environment. The strategy is based on three underpinning principles: (i) sustainable livelihoods, (ii) social justice, and (iii) a basin-wide approach. Operations will be based on (i) a long-term perspective, (ii) selectivity

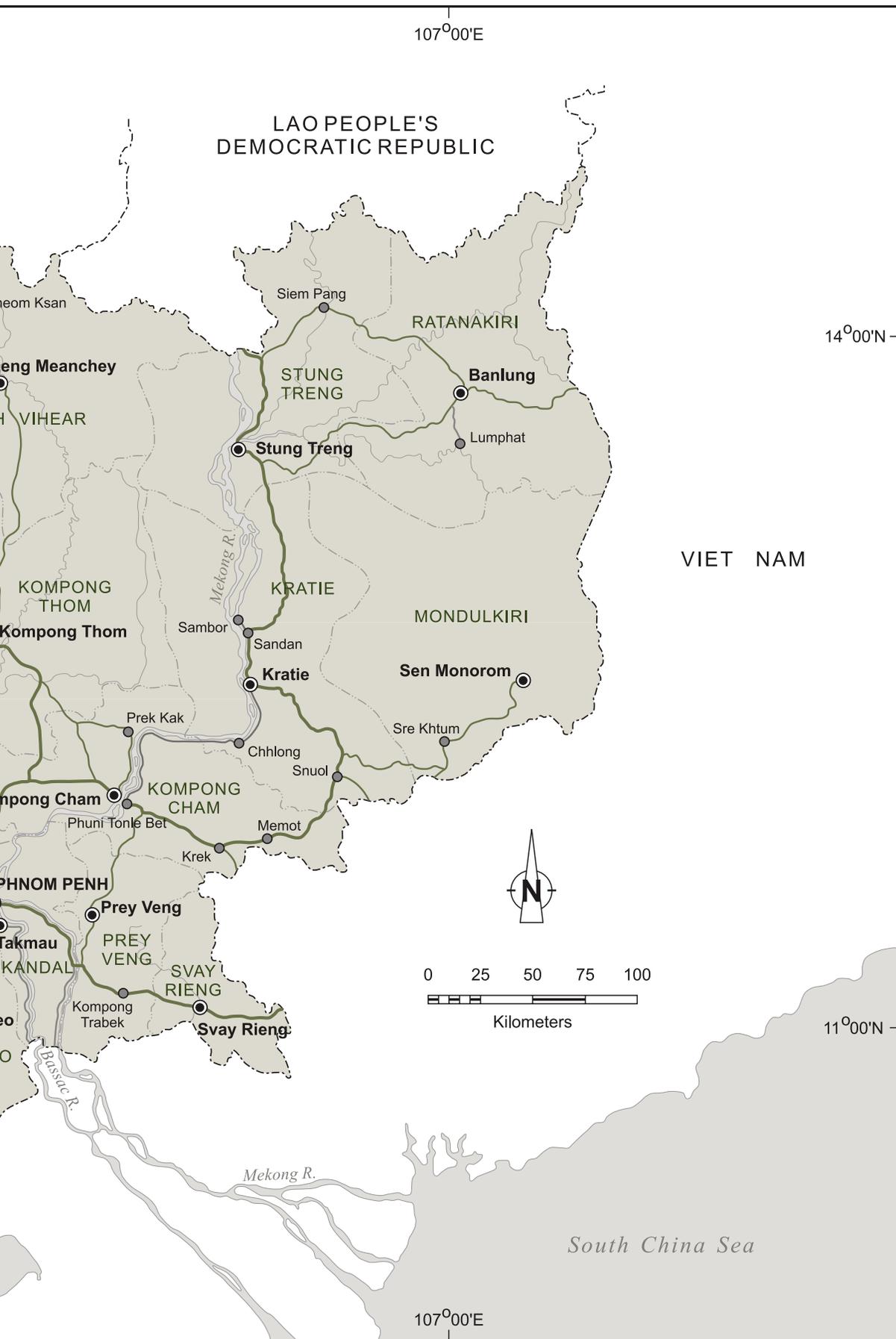
and concentration, (iii) partnerships, (iv) country ownership and delegation, (v) informing and listening, and (vi) judicious use of modalities. The strategy focuses on two core areas. In respect of rural development and the environment, it expands the knowledge base upon which the sustainable utilization and preservation of the basin depend, addresses how the livelihoods of the communities can be enhanced, improves catchment management, and strengthens the regulatory and management framework and institutional structures at the local and national levels that are needed to support development. In the field of human development, it provides targeted support in health and education. Crosscutting themes ensure that attention is paid to vulnerable groups, governance, resource cooperation, and the private sector. Implementation of the strategy will afford a significant and positive contribution to more effective basin management; offer possibilities for cooperation with local, provincial, and national stakeholders to balance ever-increasing demands on the lake's resources; and encourage continuity, give confidence to stakeholders, and present opportunities to resolve current and future challenges. This concentration of resources can also catalyze other bilateral and multilateral endeavors.

The Tonle Sap Basin Strategy marks the introduction of basin-level strategic planning in Cambodia. The strategic planning process is iterative and provides regular opportunities for inputs in support of the Country Strategy and Program (2005–2007) and its annual updates; the Poverty Reduction Partnership Agreement entered into by the Government and ADB; the Rectangular Strategy of the Government; the goals of the United Nations Millennium Declaration of September 2000; and Cambodia's international obligations vis-à-vis the Tonle Sap. The details of ADB's thematic and sector support programs will be laid out in the annual updates of the Country Strategy and Program.





Herman Ramos





Introduction

1. Cambodia is one of the Asian Development Bank (ADB)'s poorest developing member countries. In the Human Development Report (2004), it ranked 130 out of 177 countries. About 36% of Cambodia's population lives below the poverty line.¹

2. Recent economic growth has favored the capital, Phnom Penh, and its environs.² The incidence of poverty in rural areas is four times higher than that reported in Phnom Penh. Notably, rural people have an average income that is less than one third of urban incomes. About 31% of them have completed less than 1 year of formal schooling; 96% cook with firewood at unsustainable extraction rates; and less than 1% have electricity for lighting. Fishing and foraging on common property are important constituents of the food supply. However, life is getting harder—access to lakes and forests is becoming more difficult, and high population growth is increasing the number of people to feed.³ As a result of this, there has been pressure on, and degradation of, Cambodia's natural resources for many years.

3. Cambodia's total area is 181,035 square kilometers (sq km), a large part of which consists of flat lowlands and floodplains. Its main feature, the Tonle Sap basin, extends over 44% of Cambodia's total area, including the Tonle Sap, and is home to 32% of Cambodia's total population. The watershed boundaries are formed by the Cardamom and Elephant Mountains to the south and west, the Dangrek Mountains along the

northern border with Thailand, and the narrow belt of Mekong River right bank drainage to the east. Except in the mountains, most of the watershed is less than 200 meters (m) above mean sea level (amsl).

4. The watershed feeds the Tonle Sap, the Great Lake that defines Cambodian life and conditions its prospects (Appendix 1). It is the largest freshwater lake in Southeast Asia, covering an area of 250,000–300,000 hectares (ha) during the dry season (Appendix 2). Owing to a unique hydrological phenomenon, the Tonle Sap River draining the lake reverses its flow during the wet season when the waters of the Mekong River flow into the lake to inundate 1.0–1.6 million ha for several months each year.⁴ The extensive wetlands born of this cycle are home to a large biodiversity of fish, reptile, bird, mammal, and plant species.⁵ This biological richness is reflected in the Tonle Sap's enormous productivity as a fishing area: the lake supports one of the most productive capture fisheries in the world,⁶ and provides much of the protein intake of the Cambodian population.^{7,8} The fisheries, together with the flooded forest and agricultural lands of the inundated area, have underpinned human activity since ancient times. Indeed, the Tonle Sap and the associated cultural heritage of Angkor have defined Cambodia's national identity.⁹ Today, the land, water, and biotic resources of the Tonle Sap directly benefit at least 10% of the population and, indirectly, many more in terms of food security. The lake also benefits

¹ The poverty line is the per capita expenditure needed to secure an intake of 2,100 calories per day.

² In the 1990s, economic growth was strong, within the range of 4–7%.

³ At its current growth rate (2.4% in 2003), Cambodia's population is expected to reach 14 million in 2005.

⁴ Consequently, the lake's water level varies from 1–2 m amsl during the dry season to 8–11 m amsl during the wet season. During the rainy season, the Mekong River is estimated to supply two thirds of the lake's total volume, the balance being supplied by other rivers that flow into the lake from its 67,600 sq km watershed.

⁵ Many fish species, including the all-important *trey riel*, migrate between the Mekong River and the Tonle Sap, using the river for spawning and the flooded forest for growth and maturation.

⁶ The Tonle Sap yields about 230,000 tons (t) of fish each year, valued at \$150–200 million (based on landing data), of which about 25% is exported, primarily to Thailand. The monetary value of the catch increases through the marketing chain to \$250–500 million. Cambodia's freshwater capture fisheries production of over 400,000 t per year is the fourth largest in the world after the People's Republic of China, India, and Bangladesh. Some believe this to be an underestimate: in 2000, the National Institute of Statistics estimated production at 442,000 t. Freshwater capture fisheries contribute 10–20% of Cambodia's gross domestic product.

⁷ Nationwide fish consumption is 40–70 kilograms (kg) per person per year.

⁸ Smaller fish are of lesser commercial value but provide dietary calcium as their bones are chewed and eaten.

⁹ It is on the northwestern shore of the Tonle Sap that Khmer kings built their capital from the 9th to the 13th century.

the Mekong basin as a breeding, nursery, and forage area for migratory fish. It is of global significance for biodiversity conservation.

5. Because of its biodiversity, economic, and cultural values, the Tonle Sap is a source of conflict, at times violent. Growing population pressure, inequality of and confusion over access rights, severe poverty, and ethnic differences place the lake's ecosystem and the people that depend upon it at risk. Unfortunately, 25 years of war and civil strife under the Khmer Rouge have diminished—at all levels of Cambodian society—the ability to tackle these issues. In recent years, concern over the Tonle Sap has grown and prompted none other than King Norodom Sihanouk to warn that Cambodia faces environmental disaster if the lake's fragile ecosystem is degraded further

6. In recognition of the lake's importance, a Royal Decree designated the Tonle Sap as a Multiple-Use Protected Area in November 1993. Furthermore, the lake was nominated as a Biosphere Reserve in October 1997 under the United Nations Educational, Scientific, and Cultural Organization (UNESCO)'s Man and the Biosphere Program. But management of the Tonle Sap Biosphere Reserve (TSBR) is a great challenge for the Government.¹⁰

7. While many of the priority conservation and biodiversity issues center on the TSBR, the Tonle Sap's watershed also includes areas of critical conservation importance. There are at least 45 types of habitat, many of which are home to endangered and threatened species. The World Wide Fund for Nature has identified "Global 200 Ecoregions" representing the world's most unique biodiversity with the highest priority for conservation across all of the earth's major types of habitat. Five of these Global 200 Ecoregions are found in Indochina, and parts of the Tonle Sap's watershed are included in two of them. They are the Central Indochina Dry Forests and the Cardamom Mountains

Moist Forests. Of 26 terrestrial priority landscapes with high global or regional biological importance identified in the Lower Mekong Ecoregion Complex, three are found wholly or partly in the Tonle Sap's watershed.

8. The natural resources of the Tonle Sap basin are under pressure (Appendix 3). Today, different groups within society find themselves having to compete for resources that were once abundant. The sustainability of their livelihoods is at stake. The reasons for this are not immediately clear since several processes of change are taking place at the same time. Economic and political developments, including regional cooperation, are changing the way development decisions are made. Populations grow, move around, and make demands on local resources. The private sector is increasingly involved in resource extraction. Dams, which are constructed for power and irrigation, reduce the seasonal floods that sustain fish spawning and nursery grounds, and they also reduce the load of fertile silt that sustains farming in the Tonle Sap floodplain. New markets for resource-based products are opening up in the region and globally. In the interest of social justice, stakeholders¹¹ must negotiate a complicated nexus of agents of change, development patterns, and competing interests exacerbated by rapid population growth.¹²

9. ADB has reassessed the major challenges facing Cambodia and the changing needs of its growing population. It has concluded that poverty reduction should be considered from the perspective of the Tonle Sap basin, founded on a basin-wide strategy. ADB's strategic review of its priorities benefited from extensive discussions with government agencies, representatives of nongovernment organizations (NGOs) and civil society, multilateral and bilateral development partners, and ADB staff at all levels; the experience of ADB-funded loan and technical assistance projects;¹³ and a

¹⁰ The TSBR aims to fulfill three complementary functions. They are (i) conservation of landscapes, ecosystems, and species diversity; (ii) culturally, socially and ecologically sustainable development; and (iii) research, monitoring, and education. Management of the TSBR should be based on zoning into core areas, a buffer zone, and a transition area.

¹¹ "Stakeholders" are people, groups, or institutions that may be affected by, can significantly influence, or are important to the achievement of the stated purpose of a development initiative.

¹² About 43% of the population is below the age of 15. Population growth rates over the next decade are likely to be high because young adults will start their own families.

¹³ ADB. 1998. Technical Assistance for Protection and Management of Critical Wetlands in the Lower Mekong Basin. Manila; and ADB. 2002. Report and Recommendation of the President to the Board of Directors on a Proposed Loan to Cambodia for the Tonle Sap Environmental Management Project. Manila.

Core Natural Resource Management Issues

Resource Area	Issue
Forestry	Forests are Cambodia's most valuable resource. However, over the last 40 years, forest cover has declined from about 75% to about 55% of total area. The Government has attempted to regulate forest exploitation, but with limited success. Conversely, economic liberalization may exacerbate exploitation.
Fisheries	Inland fisheries provide over 80% of the protein intake of the Cambodian population. However, unsustainable fishing is taking place, notably on the Tonle Sap. Total catch may not be falling but the catch per fisher is. Also, the share of large- and medium-sized, higher-value fish has declined. Although Cambodia's coastal areas are less degraded than those of neighboring countries, mangrove forests are being cut for charcoal extraction, aquaculture, and salt farming. There is an increase in illegal fishing.
Water Resources	Water resources provide for agriculture, fish production, biodiversity, water supply and sanitation, transport, and hydropower. However, water is in short supply in many areas, even for domestic purposes. Competition for water resources will intensify due to irrigation development and a growing population.
Biodiversity	Cambodia is a biodiversity hotspot. It retains one of the highest proportions of land as natural habitat in the world and one of the least disturbed coastlines in continental Asia. Over 45 types of habitat have been characterized and mapped for the country, many of which are home to species of global significance. Cambodia's biological heritage is of primary importance to the subsistence of a predominantly rural population and to the future development of the nation. But it is under threat from overexploitation of fisheries and wildlife resources; dry season encroachment and land clearance of the flooded forest; and degradation of natural vegetation in watersheds, with associated changes in water and soil quality and siltation rates.

Source: ADB.

review of ADB's strengths and core competencies. The principal documents referred to included Cambodia's Rectangular Strategy (2004–2008); National Environmental Action Plan (1998–2003);¹⁴ Governance Action Plan (2001); Second Socioeconomic Development Plan (2001–2005);¹⁵ National Biodiversity Strategy and Action Plan (2002); National Poverty Reduction Strategy (2003–2005); and ADB documents on strategy, environment, and poverty.¹⁶ The strategy is

aligned with the Poverty Reduction Partnership Agreement entered into by the Government and ADB in July 2002 and will give it practical expression. It is anticipated that it will accelerate achievement of the goals of the United Nations Millennium Declaration (2000). It will also help Cambodia to meet the obligations that are embodied in more than 10 treaties and conventions, and work toward the goals of UNESCO's Seville Strategy for Biosphere Reserves (1995).^{17,18}

¹⁴ The Tonle Sap is flagged as a priority in the National Environmental Action Plan (1998–2002).

¹⁵ The National Assembly passed the Second Socioeconomic Development Plan (2001–2005) on 17 June 2002. The Senate approved it on 8 July 2002.

¹⁶ ADB. 2000. Cambodia: Enabling a Socioeconomic Renaissance. Manila; ADB. 2001. Participatory Poverty Assessment in Cambodia. Manila; ADB. 2001. Environments in Transition: Cambodia, Lao PDR, Thailand, and Viet Nam. Manila; ADB. 2002. Cambodia Poverty Review (internal document). Manila; and ADB. 2004. Cambodia: Country Environmental Analysis. Manila.

¹⁷ Cambodia's obligations vis-à-vis the Tonle Sap are embodied in more than 10 treaties and conventions, including the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention) (1971); the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1979); and the Convention on Biological Diversity (1992). One of the core areas of the TSBR, Boeng Tonle Chhmar, was designated as one of the country's three Ramsar sites in 1999.

¹⁸ The goals of the Seville Strategy for Biosphere Reserves are to (i) use biosphere reserves to conserve natural and cultural diversity; (ii) use biosphere reserves as models of land management and of approaches to sustainable development; (iii) use biosphere reserves for research, monitoring, education, and training; and (iv) implement the biosphere reserve concept.

The Poverty-Environment Challenge of the Tonle Sap¹⁹



¹⁹ See also 2000. Wayne Gum. *Inland Aquatic Resources and Livelihoods in Cambodia: A Guide to the Literature, Legislation, Institutional Framework and Recommendations*. Oxfam; 2001. *Feast or Famine? Solutions to Cambodia's Fisheries Conflicts*. A Report by the Fisheries Action Coalition Team in Collaboration with the Environmental Justice Foundation; and 2002. *Deforestation Without Limits*. Global Witness.

Poverty and Vulnerability

10. Despite the richness of its natural resources, the Tonle Sap provides an inadequate living for most of the inhabitants of the provinces that adjoin it.²⁰ The drivers of poverty are complex (Appendix 4). The indicators of poverty are more negative than those for the population as a whole, or indeed other rural areas, and the needs of the poor are acute (Appendix 5). Half of the villages have 40–60% of households below the poverty line, with a peak of 80% in some areas. Many households have no landholdings and are entirely dependent on fishing and foraging, with access to fishing areas often under dispute.

11. As elsewhere in Cambodia, health shocks and chronic illness are major causes of impoverishment. The cycle of poverty, ill health, and high health care expenditure by households (11% of household income) cripples families. About 45% of people borrow to cover the cost of health emergencies and, all too often, another response to health shocks is to remove children from schools, starting with girls. Since people frequently rely on pond water for drinking, children suffer from repeated attacks of diarrhea.²¹ Malaria, dengue fever, acute respiratory infections, and tuberculosis are endemic and the rate of HIV/AIDS infection is the highest in the region.^{22,23} Half of the children under the age of 5 are malnourished and, for every 1,000 live births, 115 children die before they reach that age.²⁴

12. Adult literacy averages 63%. This figure is inflated, as it includes the partially literate and hides wide provincial and gender

differences. Disturbingly, about 70% of children do not complete primary school, compared with the national average of 60%. Twice as many women as men over 15 years of age have never attended school. Lack of education limits the ability to recognize and take opportunities and, interestingly, there is a high demand for technical and vocational education and training. Low literacy levels, lack of access to environmental education materials, and a dearth of basic information (such as copies of laws, subdecrees, proclamations, and directives or circulars) are not propitious to decision making for natural resource management.

13. Women are particularly vulnerable. They have even more limited access than men to land ownership and other property rights, credit, paid employment, education, and health services.²⁵ They also have few opportunities for self-development or participating in community decision making since Khmer tradition ascribes a passive role to women. Nevertheless, the gender division of labor is changing overall: women and men

“My poverty is having no land, buffalo, hoe, rake, plow, transport, mosquito net, cooking pots or even plates to eat from, and a spoon and fork to pick up the food. This means I cannot possibly get enough food to eat because I lack the things I need to keep me alive for much longer.”

The “voice” is of a woman in her mid-60s living in Kampong Thom, who in her lifetime has known the comforts of prosperity and the cruelty of war and, in the return to peace, is left with nothing.

Source: ADB. 2001. Participatory Poverty Assessment: Cambodia. Manila.

²⁰ They are Battambang, Kompong Chhnang, Kompong Thom, Pursat, and Siem Reap. The population living there numbers about 2.9 million (1998).

²¹ Safe drinking water and sanitation are available to only 36% and 14% of the rural population, respectively.

²² Cambodia is ranked as a high-burden country for tuberculosis. Two thirds of the population are infected with it.

²³ The Acquired Immuno-Deficiency Syndrome (AIDS) is the late stage of the infection caused by the Human Immunodeficiency Virus (HIV). In Cambodia, 2.8% of the adult population are infected with it.

²⁴ The major causes of child morbidity and mortality are acute respiratory infection, near-natal tetanus, hemorrhagic dengue fever, and diarrhea exacerbated by malnutrition.

²⁵ Reproductive health services are particularly deficient.

Social Indicators of the Tonle Sap Provinces

Item	Banteay Meanchey	Battambang	Kompong Chhnang	Kompong Thom	Oddar Meanchey	Preah Vihear	Pursat	Siem Reap
Population	577,772	793,129	417,693	569,060	68,279	119,261	360,445	696,164
Average household size	5.1	5.3	5.0	5.3	5.3	5.5	5.2	5.4
Population density (per sq km)	87	68	76	41	11	9	28	68
Educational attainment:								
Primary not completed (%)	69.9	63.4	69.9	70.7	73.8	76.2	68.3	73.2
Literacy rate (%)	66.9	70.8	63.9	60.4	46.5	56.3	70.0	52.7
Males (%)	79.4	82.1	76.5	71.3	62.2	67.9	82.5	63.9
Females (%)	55.6	60.7	53.7	51.3	30.7	45.2	59.5	43.1
Main source of drinking water								
Dug well (%)	26.2	37.8	52.9	77.5	23.1	31.6	53.3	69.7
Spring, river, stream (%)	44.0	39.1	24.3	16.2	73.7	34.4	29.0	10.9
Labor participation rate (%)	55.2	50.7	59.1	51.9	56.2	61.9	55.6	58.2
Unemployment rate (%)	8.0	8.0	3.1	8.2	4.5	2.6	3.5	4.6
Migration (%)	33.4	39.4	46.6	17.9	38.7	20.5	41.0	27.1
Kerosene as main source of light (%)	84.6	83.2	89.9	89.4	96.2	45.8	88.1	88.8
Firewood as main source of cooking fuel (%)	90.6	92.4	95.8	95.6	97.4	98.4	94.9	96.1

Source: National Institute of Statistics. 1998. General Population Census of Cambodia.

play progressively interchangeable roles because women are increasingly called upon to meet household needs.²⁶ There are also many displaced or disabled persons, who suffer from poverty and other forms of social deprivation to an even greater extent than the rest of the population.

14. The ethnic minorities living in the Tonle Sap basin are the Vietnamese and Muslim Cham. Even though most of the Vietnamese were born in Cambodia, they do not have Khmer nationality and are classified as immigrants. This status and the historical animosity between them and the Khmers limit the Vietnamese contribution in community-based natural resource management,²⁷ despite the fact that they are among the most innovative of fishers. The Cham, who are also fishers, do not experience segregation despite their conspicuous identity. But it is a fact that all ethnic minorities are disadvantaged due to inadequate representa-

tion at management and legislative levels. The Vietnamese are further deprived by lack of property rights and language barriers.

15. The communities living on the Tonle Sap and in its lowland areas are prey to natural hazards.²⁸ In the rainy season, the lake is prone to heavy swells and high waves that are liable to topple their floating structures. The inhabitants pay to have their houseboats towed to new anchorage sites to accommodate the changing water levels and move into sheltered locations. These and other costs related to repairing damage to their houses account for as much as a third of annual expenditure. Because rural life is intrinsically linked to the cycle of flooding, the communities have developed coping mechanisms to live with flooded conditions, often for up to 6 months a year. But, when floods are deeper than normal, unexpectedly fast in onset, or unusually prolonged, they can tax community self-reliance and capacity to cope.

²⁶ Households headed by females are even more vulnerable. They account for about 25% of the total because of the genocide caused by the Khmer Rouge.

²⁷ The Vietnamese number about 100,000 nationwide. The Cham, who have lived in Cambodia since the 15th century, number 300,000–400,000 in total.

²⁸ Together, they make up 25% of the 1.2 million people living in the area bounded by Highways No. 5 and No. 6. It is not possible to distinguish between fishers and farmers. Most people are engaged in both activities.

16. Poverty is also related to extended instability and conflict, and the resultant harm to the population. Most of Cambodia experienced more peace and economic growth after 1993, but only since 1998 have areas northwest of the Tonle Sap enjoyed their first real respite from war. Many internally displaced persons, repatriated refugees, internal migrants, and demobilized soldiers are reestablishing their livelihoods in what remains a fractured society.²⁹

Resource Use Management

Tonle Sap Basin

17. In northwestern Cambodia, the Tonle Sap basin extends over an area of 80,000 sq km.³⁰ It comprises three main physiographic regions: (i) the lake, extending to a maximum area of 1.6 million ha in the wet season, now declared a biosphere reserve, and effectively bounded by Highways No. 5 and No. 6; (ii) the low-lying watershed, mainly at an altitude of less than 200 m amsl, originally covered with dry open woodlands interspersed with oases of wetter grasslands and evergreen forest, but much of which has been depleted by logging and conversion to upland agriculture; and (iii) the rainforest of the Cardamom Mountains, rising to a height of up to 1,500 m amsl, large areas of which are still relatively undisturbed. The basin is of unique importance to Cambodia as a source of primary food production, timber, and firewood; as a potential source of water and hydropower; and as a reservoir of biodiversity (Appendix 6).

18. Agriculture dominates the Cambodian economy employing 75% of the population. Its contribution to the gross domestic product, however, has declined from about 45% in 1993 to 34% in 2002 (in constant 2000 prices), due to relatively stagnant agricultural production, while production in



other sectors—especially textiles and garments—has grown. Rice is Cambodia's most important crop: it occupies 2.3 million ha of a total cultivated area of 2.8 million ha and is the staple of the Cambodian diet. Rainfed lowland rice accounts for by far the majority of production, but at less than 2.0 t per ha, rice yields are very low mainly due to limited use of inputs, poor water control, and weak technical support and extension services. Nearly 500,000 ha receive some irrigation and, in these areas, yields may rise to more than 3.0 t per ha, but are still well below yields in neighboring countries. On the Tonle Sap, they grow floating rice at the lake's edge and as a recession crop on the falling flood. While nationally, Cambodia is consid-

²⁹ Social cohesion between groups is still low. Intrinsicly, Khmer society lacks organized groups or structures above the family group. The traditionally hierarchical nature of working arrangements, ethnic differences, collective trauma from the Khmer Rouge regime, migration associated with seasonal flooding, as well as income disparities demand special efforts at community organization.

³⁰ The total size of the Tonle Sap basin is 85,000 sq km, including a small area in Thailand.

ered to be self-sufficient in rice, for many households production of rice is sufficient to meet their needs for only half the year. In 1998, for instance, the World Food Programme supported 1.7 million people (15% of the population) for an average 45 days.

19. After rice, freshwater fish is the most important component of the Cambodian diet and up to half of this is supplied directly by the Tonle Sap, which is the most concentrated source of freshwater fish in Southeast Asia. Important types of fish caught include perch, carp, lungfish, and smelt. Information on yields is unreliable, but best estimates suggest a yearly catch of about 230,000 t of fish. While figures for the overall catch may appear to indicate that yields are not declining, there is strong evidence that the catch includes an ever-increasing proportion of small and low-value fish as the numbers of larger fish decline.

20. Agriculture and fisheries are not alone in making demands on the basin's natural resources: of the energy consumed in Cambodia, 82% is obtained from wood. For 92% of Cambodia's households, wood is also the major fuel for cooking. Although a renewable resource, it is consumed at a greater rate than it is replanted, and extraction of firewood has been an important factor in deforestation of the flooded forest and the lowland dry and evergreen forest of the watershed. With population growth, firewood demand is expected to increase, calling for the development of alternative sources of energy and energy conservation and efficiency.

21. Despite their depletion, forests in the Tonle Sap basin remain habitats of enormous importance. The flooded forest of the Tonle Sap is still by far the greatest continuous area of savannah swamp forest and inundated forest in the entire Asian region, hence its incorporation in UNESCO's World Network of Biosphere Reserves. In the current complex of vegetation communities that make up the

Tonle Sap, more than 200 plant species have been recorded. The Tonle Sap is known to be home to at least 200 species of fish in the lake alone, 42 species of reptiles, 225 species of birds, and 46 species of mammals. Within the basin's catchments are significant tracts of undisturbed forest, particularly the central lowland complex and the rainforest of the Cardamom Mountains—home to 2,300 described plants, of which 40% have traditional uses; more than 500 species of birds; and more than 130 species of mammals, some of which have only been discovered in the last decade. Together, these forest areas constitute for Cambodia an enormously important reservoir of plants and animals, many of which may be of considerable future economic significance.

22. In equal fashion, the productivity of the fisheries of the Tonle Sap depends on natural habitats. However, the flooded forest that once occupied most of the seasonally flooded area was, by 1997, estimated to be about 350,000 ha, of which roughly 30% is into the degraded forest categories of mosaic and regrowth. It is essential to preserve the

“Natural resource protection is an obligation for all.”

Source: Department of Fisheries National Fish Day, 1 July 2003.



ecosystem of the seasonally flooded areas as the basis for sustainable fish capture while, at the same time, recognizing that continuing cultivation and the collection of firewood are, at present, the only available source of livelihood for the communities living on and around the lake. Further, built structures, such as dams, roads, and flood-control works, can significantly affect fisheries by blocking migration and spawning areas, altering water quality and quantity, changing the temporal and spatial relationship and nature of the flood cycle, and degrading or fragmenting aquatic habitats. Loss of such habitats could also have dramatic impacts on the productivity of fisheries.

23. The resolution of the conflicts between production and preservation assumes particular importance in the natural habitats of the Tonle Sap basin given the country's dependence on the availability of rice and fish—for which there is no elasticity provided by other foods—and firewood. Increased agricultural productivity is essential to the country's food security and overall economy, and this can only be achieved through a

combination of intensification and extensification. Yet, intensification of fishing effort can only take place if the habitat of the flooded forest is maintained or expanded, and levels of fish stocks are enhanced by imposing and enforcing controls and expanding breeding support programs. Then again, intensification of rice production would require greater use of agricultural chemicals and increased irrigation facilities. However, fertilizers and pesticides could threaten the lower reaches of the basin, particularly the lake. Harnessing the waters of the upper catchments would pose a threat to their natural habitats and introduce potentially conflicting uses of water for hydropower, domestic consumption, and irrigation. What is more, encroachment into the forested catchment areas, whether for harnessing water resources, logging timber and firewood, or clearing forests for food and industrial crops, would destroy the ecosystem's viability and lead also to erosion, loss of soil fertility, downstream siltation, flooding, and turbidity of water bodies. Finally, any disruption to the lake's hydrology could have detrimental effects on fisheries, as it is known that water levels at peak flood and fish catch in the Tonle Sap are strongly correlated. All this means that the development planning of the Tonle Sap must be done through an integrated, basin-wide approach.

24. The Tonle Sap basin is home to about 3.6 million people (1998), most of whom derive their livelihoods directly from its natural resources. Around half of those people depend on the lake and its associated wetlands, which is also the predominant source of protein for the whole of Cambodia. Competition for scarce resources is intense. An increasing proportion of the population of the Tonle Sap basin is landless. This particularly applies to female-headed households, which are more vulnerable to shocks and resort to selling land to meet short-term health and other crises, and to the ethnic minorities who can make less claim to land rights. Access to common property is important to the livelihoods of large numbers of people, not just the landless, who depend on fishing and foraging for a living. These common property resources are, however, inadequately managed and may be hugely



overexploited or become the preserve of a favored few. The dismantling of the fishing lot system in the Tonle Sap in 2000 was supposed to reduce commercial exploitation and increase the fishing area available to local communities.³¹ However, commercial enterprises still account for a high proportion of the total fish catch. In the catchment, commercial logging, mostly illegal, has eroded the evergreen forest by about 15% in 10 years. Sustainability of common property resources hinges on equitable access, which is best advanced by community management.

25. Notwithstanding, the Tonle Sap basin offers significant opportunities for supporting productivity by providing the

irrigation water needed to expand irrigated rice areas and raise yields to levels nearer to those of Cambodia's neighbors. It has potential for provision of energy from hydropower, which could reduce some of the pressures on the forested areas (Appendix 7). And its natural resource base ought also to favor the emergence of small and medium enterprises.

Mekong River Basin

26. The importance of the Tonle Sap, however, extends far beyond the boundaries of Cambodia. In the face of the loss of wetland habitat throughout Asia, the Tonle Sap floodplain's size, habitat diversity, and relative preservation are of exceptional global and regional importance. (Other wetlands in Cambodia and Southern Viet Nam are widely disturbed.) The ecosystem is essential to the survival of many globally significant species of birds, mammals, and reptiles found around the lake. When the Tonle Sap and other parts of the Mekong system flood into fields and forests, fish take advantage of the huge increase in food availability. Some fish spawn in the main river channels, and eggs and larvae drift into the flooded areas. Other species spawn in the flooded areas. As the floodwaters recede, fish retreat to main river channels. Fish migration from the Tonle Sap helps restock fisheries as far upstream as the People's Republic of China and in many tributaries along the way. The lake also helps to control salinity intrusion and conserve mangrove forests in the Mekong delta by acting as a natural reservoir from which water drains during the dry season.³²

27. Just as the productivity and biodiversity of large areas of the Mekong River basin derive in part from the Tonle Sap, so the preservation of the lake's unique ecosystem is dependent upon inflows of water that originate far from Cambodia, with 62% of the lake's water having come from the Mekong River. In Cambodia, there is a strong correlation between water levels at peak flood and fish catch in the Tonle Sap. Not surprisingly,



³¹ In October 2000, a Prime Ministerial decree released 56% (or 500,000 ha) of the former fishing lot area to communities for management. There are now more than 160 designated community fisheries (or 300 management units) in the fishing lot area released from commercial fisheries. In conjunction with local authorities, they are to manage, conserve, and use the fisheries sustainably.

³² The Tonle Sap basin contributes 6.4% of the average annual flow of the Mekong River.

there is concern that dam construction on the Mekong River and its tributaries would affect the level of flooding in the Tonle Sap and the fisheries and farmlands that depend on it. There is also unease over plans to clear rapids and widen a shipping lane in the Mekong River to enable cargo boats to navigate between the PRC and Thailand in the dry season.

28. The countries of the Greater Mekong Subregion (GMS) share the forest, water, and biodiversity resources that endow the region with one of the world's richest natural environments: there is an interdependence among all elements of that environment, which crosses national boundaries. The countries must share responsibility for meeting the transboundary environmental challenges posed by international rivers and watersheds, trade in forest products, and expansion of regional infrastructure. Better transboundary environmental governance is important because the complex mosaic of national interests creates a situation in which competition for regional resources will increase with further economic growth. Concurrently, poverty in communities has led to overexploitation of natural resources, with environmental implications that extend beyond localities. Large-scale development activities and illegal exploitation of natural resources also threaten local and regional environments. What is good for one country or region might have devastating consequences for another: governments in the GMS will face increasingly difficult problems as they try to balance the competing interests of flood control, hydroelectric power, shipping, fishing, agriculture, and environmental protection. This warrants continuous international support to the Mekong River Commission (MRC)'s basin development plan and water utilization program and operating within the strategic environmental framework for the Greater Mekong region prepared by ADB.^{33,34}



Policy, Institutional, and Market Constraints

29. Despite impressive efforts to establish a policy framework that supports development, environmental quality and standards of living in Cambodia continue to decline. One reason for this is that existing legislation is not enforced, either because Government agencies lack technical and managerial capacity, or because of corruption. In the Tonle Sap basin, policy failure has revealed itself most obviously through the absence of effective property rights in fisheries, forestry, and land. Environmental degradation has also resulted from subsidies on resource use and from the failure of resource pricing to fully reflect environmental costs.

30. In some instances, existing legislation may conflict or provide insufficient guidance because of the continued

³³ MRC was set up in 1995 to promote and coordinate the sustainable development and equitable management of the water and related resources of the Mekong basin for the mutual benefit of the countries and peoples involved.

³⁴ ADB. 1998. Strategic Environmental Framework for the Greater Mekong Region. Manila. This regional technical assistance prepared a strategic environmental framework that promotes the integration of environmental considerations in economic development planning and implementation. It recommended that strategic interventions for ADB and its partners should (i) support informed decision making through improved planning and assessment, (ii) foster public involvement, (iii) build effective institutions and enhance governance, and (iv) provide innovative and persistent financing for ecosystem protection and social development.

dominance of sectoral approaches to policy making and lack of public participation during formulation. Preparation of legislation should be organic and grow out of experience, local practice, potentialities, and needs. In addition, a positive approach to ensuring compliance with legislation is preferable to a negative approach that requires policing action: experience demonstrates that negative approaches encourage bribery and extortion, not compliance.

31. Government agencies at the central level that have traditionally exercised direct responsibility for development are still beset with problems of overstaffing, a command-and-control mind-set among senior staff, and limited management capacity. Despite their changed mandate to perform through decentralization, they still have not fully realigned their systems or capabilities: they are still project- and incentive-dependent, with a preference for large structures and schemes in

the face of low budgets for operation and maintenance. They should build community development expertise and field qualified staff at the provincial and district levels.

32. Implementation of policy requires appropriate institutional structures based on the rights and responsibilities of the people. These can only be effectively recognized in a decentralized system, wherein each level of government has a clearly defined role that maximizes the participation of the people while providing for an overall harmonization of activities. In 2001, the Government embarked on a process of devolution of authority and responsibility to local governments through decentralization to commune level and an associated deconcentration of management functions to the provincial level to effect a new era of grassroots democratization. This has led to a three-tier structure of central, provincial, and communal institutions each with its defined role. The manage-



ment of natural resources, however, must be effected at lower institutional levels if it is to achieve long-term and equitable sustainability and environmental protection. This will require strengthening the lower levels of the institutional structure, including Village Development Committees, Village Administrative Groups, and demand-based organizations, such as water user groups or parent-teacher councils, which also have major roles to play. At the same time, it is recognized that the basin is an ecological entity, the overall management of which calls for basin-level coordination at a multisectoral level.

33. Poverty reduction requires that the poor access interlocking markets and services for (i) agricultural and fisheries products and inputs, (ii) production support and credit, (iii) information, (iv) assets, (v) labor, and (vi) food and other consumer goods. However, the terms under which the poor enter and

participate in these markets and services are all too often inequitable. Many of them are merely passive participants, often obliged to sell low (immediately after harvest) and buy high, with little choice of where they conduct their transactions, with whom, and at what price. With the liberalization of domestic markets and the globalization of international markets, these markets have become more open, with more choices. But they are also more complex and uncertain.

34. Enhancing access to markets is a pressing challenge, and it is vital to understand better how they operate. In the Tonle Sap provinces, for instance, fishers cannot realize the true value of fish because of lack of information: the dynamics and volume of trade, the market structure, and power of traders are not understood. There is also little knowledge of trade-related population movements to the lake.³⁵



³⁵ Huge population movements to the Tonle Sap and its tributaries take place each year when people trade rice for troy riel and other small fish species to make prahoc (fish paste).

ADB's Response





Country Strategy and Program

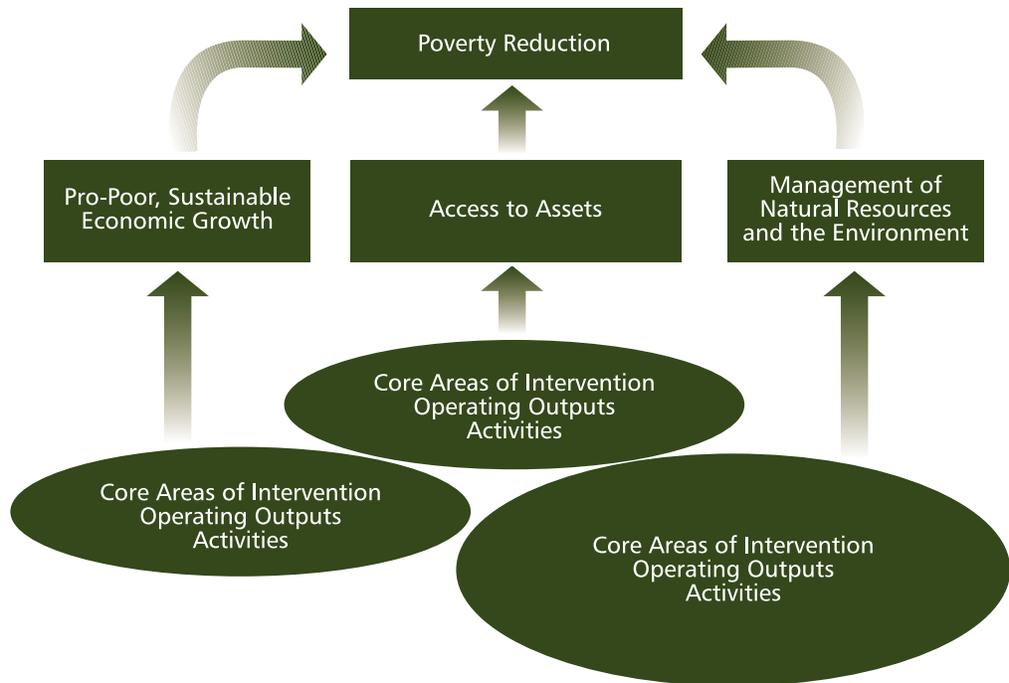
35. ADB's Country Strategy and Program (2005–2007) targets broad-based economic growth, inclusive social development, and good governance. It also focuses on the Tonle Sap basin.³⁶

The Tonle Sap Basin Strategy

36. Population and development pressures are taking their toll, and consumptive use of the Tonle Sap's resources is intense. The threats to the lake's ecosystem are manifold. They include overexploitation of fisheries and wildlife resources, dry-season encroachment and land clearance of the flooded forest, and degradation of natural vegetation in watersheds, with associated changes in water and soil quality and siltation rates. Each threat to the Tonle Sap has multiple root causes, the severity of which conditions the speed and manner in which they can be addressed. Never has the Tonle Sap been called upon to supply so much to so many. Even greater challenges lie ahead: conversations with stakeholders confirm the overwhelming number and diversity of issues. Solutions are elusive. Even so, the following strategic principles must underpin progress: (i) sustainable livelihoods, (ii) social justice, and (iii) a basin-wide approach.

³⁶The geographical focus responds to a central recommendation of ADB, 2002. Cambodia Poverty Review (internal document). Manila.

Meeting ADB's Country Strategy and Program (2005–2007)



37. The Tonle Sap Basin Strategy forms the basis for setting priorities and planning investment and development assistance over the next 5–10 years. It meets the key elements of ADB's poverty reduction strategy within the unique context of the Tonle Sap basin. It marks the introduction of basin-level

strategic planning. It favors projects that promise the biggest return in terms of poverty reduction. The strategic planning process will be iterative and provide regular opportunities for inputs in support of the Country Strategy and Program (2005–2007) and its annual updates. It will concentrate attention and encourage discussion and further work to guide operational directions. While primarily providing the desired ADB focus on the Tonle Sap basin, it will also catalyze other bilateral and multilateral endeavors.



Goal and Development Objectives

38. Based on ADB's overarching goal, the strategy aims to reduce poverty. Toward this goal, its development objectives are to foster, promote, and facilitate (i) pro-poor, sustainable economic growth, (ii) access to assets, and (iii) management of natural resources and the environment.

Strategic Principles

Sustainable Livelihoods³⁷

39. There is still inadequate understanding of what can be done to help the rural poor.³⁸ The challenge is to focus on the multiple aspects of their livelihood assets.³⁹ Livelihoods draw on the resources accessed and the activities undertaken in order to live. However, in Cambodia, human capital was seriously affected by the extermination of a generation of leaders, levels of health and education are low, and women shoulder heavy responsibilities as a consequence of male deaths during the protracted civil war and genocide.⁴⁰ Social capital has been severely diminished, and democratic processes have only recently been introduced. Natural capital—especially forests and fish—is under increasing human exploitation. Physical capital—particularly roads and water supply—is inadequate, and there is poor coverage of schools and health posts. Access to financial capital is restricted. The structures and processes that underpin the five categories of assets are institutions, policies, legislation, culture, and power relations. They determine access, terms of exchange, and returns; shape the livelihood strategies of the poor; and govern their outcomes.^{41,42}

40. Tackling poverty in Cambodia means working with the rural poor, initially where livelihood assets are being affected by unfavorable trends, e.g., overfishing, drought, pest outbreaks, floods, or deterioration of infrastructure. Such trends are obvious in the



Tonle Sap basin. The livelihoods approach is a way of thinking about the objectives, scope, and priorities for development. It seeks to develop an understanding of the factors that lie behind the people's choice of livelihood strategy and then to reinforce the positive

³⁷The Department for International Development of the United Kingdom has established a learning platform for creating sustainable livelihoods at Livelihoods Connect (www.livelihoods.org).

³⁸Lack of understanding is best expressed in financial terms: according to the World Bank, the central lowland provinces, although home to more than two thirds of the rural poor, have received only 20% of aid.

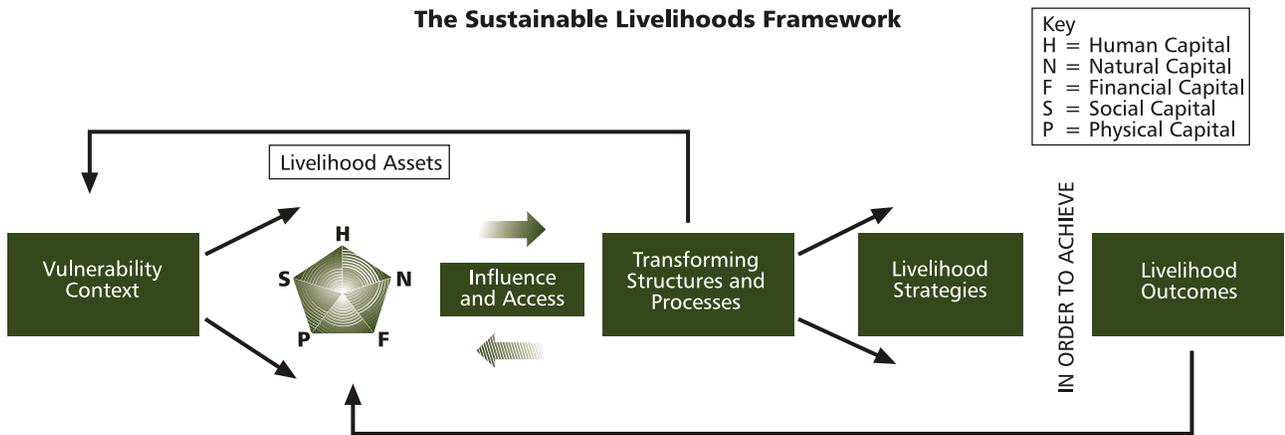
³⁹Livelihood assets can be divided into five core categories, or types, of capital: (i) human capital, e.g., skills, knowledge, and ability to labor; (ii) social capital, e.g., networks and connectedness, formalized groups, and relationships of trust; (iii) natural capital, e.g., natural resource stocks from which resource flows and services useful for livelihoods are derived; (iv) physical capital, e.g., transport, shelter and building, water supply and sanitation, energy; and access to information (communications); and (v) financial capital, e.g., available stocks and inflows of money.

⁴⁰While women constitute more than half (about 52%) of the population, they account for about 66% of the economically active population.

⁴¹Structures exist at various levels. They are most obvious as public sector organizations, e.g., political (legislative) bodies, executing agencies, judicial bodies, and parastatals, which operate in cascading levels with varying degrees of autonomy and scope of authority. Private sector organizations, e.g., commercial enterprises, civil society agencies, and NGOs also operate at different levels from the multinational to the very local.

⁴²Processes determine the way in which structures (and individuals) operate and interact. They provide the incentives that stimulate people to make choices, grant (or deny) access to assets, enable people to transform one kind of asset into another through markets, and influence interpersonal relations.

The Sustainable Livelihoods Framework



Source: Department for International Development of the United Kingdom.

aspects and mitigate against the constraints or negative influences. Its core principles are that poverty-focused development activity should be people-centered, responsive and participatory, multilevel, conducted in partnership, sustainable, and dynamic. The livelihoods approach puts people at the center of development, thereby increasing the effectiveness of development assistance.

Social Justice

41. Social justice is the pursuit of a society that offers equal opportunity to access freedoms and choices, and encourages the development of all the capacities of all its members. It is a precondition to poverty

reduction. For that reason, Cambodia's Second Socioeconomic Development Plan (2001–2005) highlights social justice. It identifies the need for (i) economic growth to include sectors in which the poor derive livelihoods, (ii) social and cultural development, and (iii) sustainable use of natural resources and sound environmental management. However, extreme inequality of access to assets, a highly skewed distribution of wealth whereby the lowest 10% of households receive just 3% of estimated total household income while the highest 10% receive nearly 35%, insufficient or nonexistent rights of tenure, and cultural and ethnic divisions strain intragenerational responsibility and equity and threaten the environment. Women, for instance, make up a disproportionate share of the poor and their condition is reflected in indicators, such as access to social services and illiteracy. What is more, the importance of meeting the needs of the present without compromising the ability of future generations to meet their needs adds force to the case for intergenerational responsibility and equity.

42. Inclusion of the full spectrum of stakeholders is crucial to achieving social justice. This calls for social development that puts people first and empowers the weaker groups in society to gain access to assets. Social support programs must respond to the needs of the poor, women, the aged, and the otherwise disadvantaged; ensure equity in development; and maintain the social cohesion necessary for continued growth.



Law and policy reform also has a vital role to play, especially when it relates to fair treatment regarding the development of environmental laws, regulations, and policies.⁴³

Basin-Wide Approach

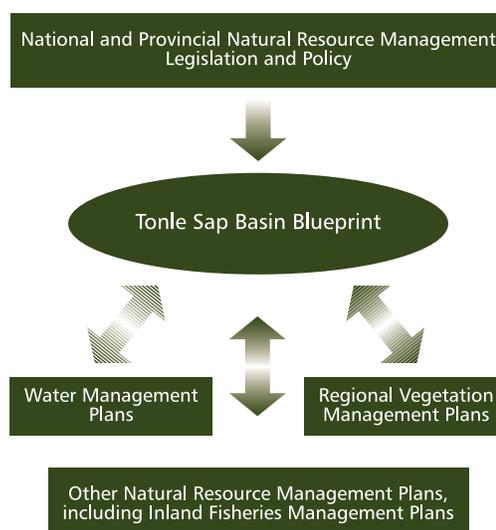
43. There is a worldwide trend toward planning and managing water resources based on basin or catchment units.⁴⁴ Over the coming years, the Tonle Sap’s natural resources would be best managed through the mechanism of long-term natural resource management plans developed collaboratively by local, provincial, and national stakeholders. A basin-wide approach will allow stakeholders to focus on issues that transcend boundaries, and greatly increase understanding of the poverty-environment challenge. The rationale behind the basin-wide approach stems from the fact that natural resources do not recognize interjurisdictional boundaries, and that planning and management decisions in one part of a basin can have significant impacts on natural resources elsewhere. An early imperative is to develop better institutional arrangements for basin management.

44. Natural resource management plans developed in partnership by communities and the Government would outline a transparent and equitable process of resource management over 10 years. They would incorporate community aspirations regarding natural resources and contain the necessary rules relating to their management. They would need to provide both a period of resource security to natural-resource users, such as fishers, and an ability to change plans over time to adapt as new information becomes available. Individual plans might include water management plans, regional vegetation management plans, and fisheries management plans. There would be regular reporting between the Government and communities on the extent to which the plans are being

effective in achieving their objectives. In this way, there would be more accountability to communities to ensure that all efforts and investments are best placed to deliver on results.

45. A Tonle Sap basin blueprint would incorporate and integrate individual natural resource management plans. It would set priorities for the basin as a whole, consistent with national and provincial policies, and in line with the specific areas for action promoted by ADB’s water policy.⁴⁵ It would be the way by which communities and the Government can reconcile competing demands on natural resources and balance long-term environmental outcomes and social and economic aspirations. Ideally, responsibility for preparation of a basin blueprint is given to a basin management organization constituted to take on this role or to play a major part in it. Such organizations transcend administrative boundaries and are best placed to understand the implications of competing or conflicting use of a basin’s total resources. A basin management organization can also be the coordinating mechanism for externally funded activities across the basin.

Basin Blueprint Sets Priorities for the Tonle Sap Basin



⁴³ The recent approval of a subdecree on social concessions for subsistence land farming, for instance, augurs well. But the true test for improving governance in resource management will lie in its implementation.

⁴⁴ ADB. 2001. Water for All: The Water Policy of ADB. Manila.

⁴⁵ They include river basin planning and organization, water rights and allocation, watershed issues, and flood management.

Delivering the Strategy





Operating Principles

Long-Term Perspective

46. Improving policy, building capacity, creating and strengthening productive capacity, infrastructure and services, and promoting regional cooperation are long-term tasks. They depend on continuity of interventions: one-shot projects are of limited sustainable value.

Selectivity and Concentration

47. ADB cannot be involved in every sector and throughout the country. To achieve its objectives of influencing the policy framework, establishing tangible improvements in capacity, and ensuring that the projects that it finances are linked to and support these end results, it must be more selective with the limited resources at its disposal. Concentrating a portion of its resources in targeted sectors in the Tonle Sap basin will be more conducive to development impact.

Partnerships

48. Partnerships are formally recognized collaborative, mutually beneficial activities between ADB and the Government, NGOs, regional and international organizations, research centers, and the private sector. Selection of partners will be guided by the principles that partnerships should (i) have a shared vision of needs and how they can be addressed; (ii) be participatory, with joint sharing of responsibilities and accountability; (iii) have complementarity of skills between partners; (iv) be within priority areas of ADB and those of partners, and meet the criteria set by them; and (v) result in ADB's skills and knowledge benefiting the partners' activities and vice versa.

In delivering the Tonle Sap Basin Strategy, ADB's Mekong Department will be guided by its vision to better serve

Cambodia by

- being a reliable and responsive partner, and
- ensuring that ADB support is provided in an integrated manner.

Country Ownership and Delegation

49. Country ownership must be evident in the political commitment to reforms, programs, and projects. At the same time, multilateral and bilateral agencies remain accountable for

ensuring that loans proceed only where there is an adequate policy framework and institutional capacity to achieve their objectives. Having effective field offices is one means of striking the right balance between national ownership and the active involvement of multilateral and bilateral agencies. Quality and excellence in delivery of interventions hinge on local knowledge and a local presence. To the extent possible, ADB will delegate operational responsibilities to its Cambodia Resident Mission. This will facilitate the day-to-day conduct of business, ensure on-the-spot assessment of country needs, and tailor technical solutions to local realities.

Informing and Listening

50. Disclosure of information has become a central operational principle for all multilateral and bilateral agencies. During the last 10 years, they have done much to improve the flow of information.⁴⁶ They explain their activities better to investors, academics, researchers, journalists, and NGOs in a language that appeals to nonspecialists. On 29 May 2003, ADB approved a new accountability mechanism to address the concerns of persons affected by ADB-assisted projects. The ADB accountability mechanism consists of two complementary functions—a consultation phase and a compliance review phase—

⁴⁶ADB's Policy on Confidentiality and Disclosure of Information was approved in August 1994.

which together will replace ADB's Inspection Function, approved in December 1995.

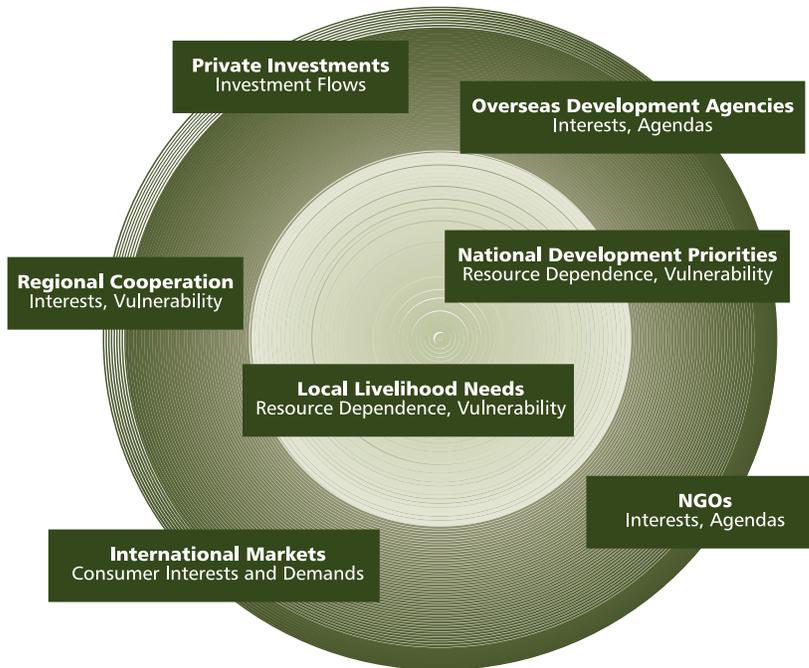
51. Under the Tonle Sap Environmental Management Project, channels of dialogue have been opened and will continue to be developed. So far, they include a biannual Tonle Sap Initiative brochure with a wide circulation in the English and Khmer languages and a website for the Tonle Sap Environmental Management project offering links to news releases, documents, and project-related articles. In addition, ADB's Water Awareness Program will explore opportunities for grant funding to showcase Tonle Sap activities as they progress, including international media visits, a film documentary, and a water education and awareness program that stimulates critical thinking and local ownership of community problems.

52. But ADB should also receive more diverse information. This two-way exchange of information must encompass the full spectrum of factors and players that commonly influence one another and the development agenda.

- National development priorities.** National development priorities are molded by national interests and strategies that commonly focus on the achievement of economic growth.
- Local livelihood needs.** Livelihoods, particularly those of the poor, are shaped primarily by local circumstances and vulnerability to changes.



Factors and Players in Development Decisions



Source: Måns Nilsson and Lisa Segnestam. 2001. *Region in Change: The Institutional Challenge for Natural Resource Use and Development in the Mekong Region*. Stockholm Environment Institute.

- (iii) **Regional cooperation.** Regional cooperation is often driven by common perceptions of economic advantages in the global arena, but can also be promoted through a willingness to reduce conflicts, imbalances, and vulnerabilities.
- (iv) **International markets.** International markets impact through variances in consumer interests and demands.
- (v) **Overseas development assistance.** Overseas development assistance pursues specific interests, agendas, and mandates. Poverty reduction is a common concern among multilateral and bilateral actors, but also a more specific focus on issues, such as health or environmental sustainability.
- (vi) **NGOs.** NGOs pursue specific interests and agendas. Common interests include human rights, environmental sustainability, health, and poverty reduction.
- (vii) **The private sector.** The private sector has come to play an increasingly important role through investment flows, directed by consumer demand, production costs, and resource availability.
- (viii) **Academics, researchers, teachers, and specialists.** Academics, researchers, and specialists contribute their ideas and findings in various research areas and topics. Primary and secondary school teachers, as well as curriculum developers, can influence attitudes by means of national education programs, particularly through national environmental education and awareness campaigns.
- (ix) **The media.** The media plays a role as communicator and magnifier of movements around the world.

53. In Cambodia, all of these factors and players are relevant. However, the national development priorities and local livelihood needs are more fundamental than the others and, thus, should be put at the center of analysis. To achieve this, new channels of dialogue will be promoted through ad hoc consultative meetings and forums with the Government and local communities.

Judicious Use of Modalities

54. The strategy takes a holistic view of the Tonle Sap basin and aims to use lending and technical assistance instruments to maximize development impact. When translated into actual assistance, the strategy aims to entail the use of

- (i) advisory technical assistance for sector and institutional analyses and for capacity building;
- (ii) project preparatory technical assistance and program loans where costly and difficult sector policy reforms need to be front-loaded to make investments viable;
- (iii) project preparatory technical assistance and sector development programs where a synchronous mix of sector policy reforms and investments is desirable;
- (iv) project preparatory technical assistance and project loans where specific investments that are relatively immune from policy distortions, if any, are warranted; where the latter can be successfully and sustainably addressed under the project loan; or where pilot approaches are to be tested; and
- (v) project preparatory technical assistance and sector loans where policy frameworks and institutional capacities are substantially in place.

Activities and Operating Outputs

55. Economic and sector work, thematic studies, programming and processing of loan and technical assistance projects, project administration, and aid coordination will be the regular activities expended in support of the strategy.

The operating outputs will be the loan and technical assistance projects approved, the portfolios managed, and the cofinancing mobilized (Appendix 8).

The Strategy Matrix

56. The strategy matrix is an operating tool to enhance focus on the Tonle Sap basin (Appendix 9). As a logical framework for developing the Country Strategy and Program, the matrix is designed to ensure that all operations in the region, and their development objectives, are viewed holistically. The Country Strategy and Program and its annual updates will identify activities in the core areas of intervention, and the crosscutting themes will be used to broaden and deepen the impact of interventions in the core areas. The rows of the strategy matrix are the development objectives and the columns are the core areas of intervention and the crosscutting themes identified as most relevant to constraints and opportunities in the Tonle Sap basin. The strategy matrix will help to (i) make decisions (trade-offs) about which activities ADB



will undertake; (ii) identify linkages, namely how activities relate to each other and, thereby, identify clusters of activities; and (iii) assist with the differentiation, namely identify which clusters of activities are suited to which clients and settings, and how a given cluster should be implemented.

Coordination

57. Good coordination should lead to better sharing of information among multilateral and bilateral agencies, improved decision making about the use of external assistance, greater harmonization and convergence of donor practices and procedures, enhanced development results, and greater public support for a country's efforts.⁴⁷ Achieving good coordination is the responsibility of the recipient country. For this reason, it begins with a government-owned country development strategy, based on internal analysis and

broad-based public consultation. It entails a regular assessment of the collective experience of donors and the Government to permit the identification of best practices, e.g., impact in reducing poverty. It should result in a common understanding of assistance needs and a sharper division of multilateral and bilateral agency efforts reflecting

their comparative strengths and experience.

58. On the Tonle Sap, the primary interagency institution is the Cambodia National Mekong Committee (CNMC), with a membership of 10 ministries and a linkage with MRC.⁴⁸ In response to the growing need for interministerial natural resource management coordination and planning, a TSBR Secretariat was established in CNMC by subdecree in September 2001.⁴⁹ Establishment in CNMC affirms the TSBR Secretariat's legitimacy as the coordinating body for the Tonle Sap and, thereby, its influence in all sectors of the Government. The TSBR Secretariat's structures and facilities are being strengthened under the Tonle Sap Environmental Management Project. For these reasons, it is expected that the Secretariat will play an increasingly prominent coordinating function. The close involvement of the Council for Agricultural and Rural Development should also be sought.

59. For their part, multilateral and bilateral agencies must clarify their respective strengths and competencies. They should make a more determined effort to base their assistance strategies on coordinated, if not joint, economic and sector work and thematic studies. For this, various forums exist, such as the Consultative Group for Cambodia and the in-country donor Working Group on Natural Resource Management. Better coordination between multilateral and bilateral agencies offers considerable opportunities for synergies and eliminates overlap.

60. In ADB, coordination among the project divisions responsible for the activities and operating outputs is essential to accomplish the strategy. Therefore, in advance of Country Strategy and Program updates, and in consultation with ADB's Cambodia Resident Mission, ADB's projects divisions will liaise to prepare a viable program. The program will



⁴⁷ The main multilateral stakeholders are the United Nations agencies, ADB, the World Bank, and the European Union. Japan is the largest donor. Australia, the United States, and France are the other principal bilateral donors.

⁴⁸ CNMC's role is to advise the Government on all matters related to the formulation of water policy, strategy, management, preservation, investigation, planning, and restoration, and the development of the water and other natural resources of the Mekong River basin within Cambodia.

⁴⁹ The Subdecree on the Establishment, Role, and Functions of the Secretariat of the TSBR of September 2001 structured the TSBR Secretariat into three divisions for policy, strategy, and networking; research, monitoring, and data management; and administration and training.



(i) cover the base year and three forward years for loan and technical assistance projects, economic and sector work, and thematic studies; (ii) prioritize sector studies; (iii) adjust the loan pipeline over time to conform with priorities; (iv) reduce over-programming to the extent possible to enable the budget process to be more responsive to the program; (v) indicate how lessons learned have influenced the loan, technical assistance, economic and sector work, and thematic study program; (vi) indicate how the loan, technical assistance, economic and sector work, and thematic study program meet the needs in the Tonle Sap basin and the priorities established in the country strategy; and (vii) incorporate aid coordination and cofinancing. The strategy will also be implemented in harmony with ADB's GMS Program, which promotes cooperation in the subregion.



ADB's Strengths and Competencies

61. As a multilateral institution, ADB has global perspectives, experience, and resources. Yet, being anchored in Asia and the Pacific, it can reflect and respond to the region's development issues. The Tonle Sap is more than a national resource: it has regional and global dimensions. ADB is in a unique position to communicate the basin's special requirements on the global stage, mobilizing international resources for poverty reduction. ADB has a strong Asian character and is perceived to be sensitive to the region's diverse social and cultural environment. As the leading international development finance institution in Cambodia, it has also gathered valuable cross-sectoral experience.

62. During the initial years of its operations, ADB translated its mandate into the role of a project financing institution. Over the last 20 years, it has also assumed a development niche that may be characterized as follows:

- (i) a sector-focused development institution that provides an integrated package of policy support, capacity building, and investment services to key sectors in its developing member countries;
- (ii) a regional development institution with a mandate to promote regional cooperation, translate global concerns into regional initiatives, and represent regional concerns at global forums;⁵⁰ and
- (iii) a catalyst development institution that uses its project investments to leverage policy change, capacity development, and greater private sector investment.



Operational Program



63. To meet the poverty-environment challenge of the Tonle Sap in accordance with the strategic and operating principles specified above, two core areas of intervention and four crosscutting themes have been identified. Within each of the core areas of intervention, the Government and ADB, together with other partners, will develop an integrated package of loan and technical assistance projects designed to meet the three development objectives of (i) pro-poor, sustainable economic growth; (ii) access to assets; and (iii) management of natural resources and the environment.

Core Areas of Intervention

Rural Development and the Environment

64. While much has been done in recent years to develop an improved understanding of the multiple dimensions of poverty in Cambodia's rural areas, the livelihoods of the communities in the Tonle Sap basin—and particularly those that are most directly dependent on the lake and its immediate surrounds—present an exceptional level of complexity. The relationships between rice production and fishing, the massive seasonal movement of people between the lake and its lower catchment areas, issues of access to common property resources, and the patterns of trade in aquatic resources must all be much better understood so that the interventions proposed are both relevant and appropriate. Much also needs to be learned about the breeding, sustainable extraction rates, and migratory patterns of fish taken from the lake. The livelihoods of the Tonle Sap basin communities are entirely dependent on a unique hydrological regime that is under threat from a wide range of structures already built or planned both within and outside Cambodia. If livelihoods are to be preserved, much more needs to be known about the influence of such structures. ADB will, therefore, commit to supporting the expansion

of the knowledge base on which must be founded the basin's overall process of development.

65. The majority of the population of the Tonle Sap basin lives on the lake and in the seasonally flooded areas and lower-lying catchments. Much needs to be done to improve and ensure the sustainability of the livelihoods of the communities there if they are to be lifted from poverty. Recognizing their current assets and taking a positive approach to building on them are necessary. Under the strategy, specific interventions may include (i) public investment in irrigation and research and extension, (ii) enhancing fish stocks in the lake and rice fields, (iii) improving rural and primary road network to connect villages to markets, (iv) providing affordable rural electric supplies, (v) developing alternative livelihoods, (vi) promoting small and medium enterprises, (vii) strengthening the legal environment, including land titles and equitable access to common property resources, (viii) promoting the status of women in the agriculture sector, (ix) increasing the efficiency of both input and output markets for farmers and providing credit facilities, and (x) reducing the vulnerability of communities to natural disasters.

66. None of the measures that might be introduced to improve the livelihoods of the communities living in the Tonle Sap basin can be effective or sustainable without addressing the overall environmental management of the basin. Protection of the watershed, and particularly the forested upper catchments, is essential to livelihood sustainability. Under the strategy, specific interventions will, therefore, be attributed to measures to improve catchment management that may include (i) applying the Forestry Law to provide a permanent framework for sustainable forestry management, (ii) rationalizing the forest concession system and delineation of permanent forest estates, (iii) enhancing forest productivity, (iv) developing community forestry and land use planning, with long-term tenure rights to local communities and indigenous peoples, (v) developing alternative livelihood systems for communities whose current activities are incompatible with the preservation of the

environment, and (vi) providing alternative energy sources and more efficient use of existing sources. Support will also be given to the amelioration of threats to the environment arising from increased use of persistent organic pollutants and from human habitations that contribute to the pollution of the lake.

67. The strategy recognizes that interventions in rural development and the environment require an appropriate legal and institutional framework. In particular, it has been proposed that the Tonle Sap basin must be managed as an entity, but that management must be genuinely representative of all stakeholder interests and include effective mechanisms for the exchange of information and views. It is acknowledged that resource management is multilayered and must embrace the lowest strata of governance—such as Village Development Committees, Village Administrative Groups, and demand-



based organizations—as well as provide for an integrated basin planning approach. ADB will support the Government's efforts to decentralize with particular emphasis on building community-based natural resource management systems, and will assist in examining appropriate organizational structures for integrated basin management. Support will

also continue to be given to the ongoing improvement of the regulatory and management framework for inland fisheries, with particular attention to community fisheries.

Human Development

68. The strategy's interventions in the core area of rural development and the environment, which are based on enhancing the natural and physical assets of the people living in the Tonle Sap basin, can only be effective if they are underpinned by the development of their human assets particularly through improvements in health and education.

69. Poor education and high rates of adult illiteracy in rural areas constrain human development. This situation has been shown to be particularly severe in the Tonle Sap basin, where investment in education remains low.⁵¹ Education is fundamental to poverty reduction. People without literacy or numeracy skills have little opportunity to improve their economic status or even to participate fully in society. In the Tonle Sap basin, emphasis is being given to community-based natural resource management, and it is important that all members of society be on an equal footing. This applies in particular to women who, despite heading a high proportion of households, have literacy levels that are significantly below those of men. The Government aims to improve the quality of education. The ADB-assisted Education Sector Support Program (2001–2005) is committed to (i) increasing access to educational services of improved quality and internal efficiency, particularly for the poor and vulnerable; (ii) expanding enrollment in basic education to all children through the provision of additional classrooms, teaching materials, and teachers;⁵² (iii) reducing inequality in education through the provision of targeted scholarships for vulnerable groups, including ethnic minorities and girls in primary school; and (iv) promoting non-formal education and technical vocational education and training. ADB will address

⁵¹ 2003. World Food Programme. Poverty and Vulnerability Analysis and Mapping in Cambodia.

⁵² Improved water supply and sanitation could also lift enrollments.

these broad objectives in the Tonle Sap basin, providing both targeted and multisectoral support in view of the basin's special circumstances. It will tackle gender-based inequality in education and will also take into account the Tonle Sap basin's cultural and geographical diversity and the problems associated with large seasonal movements of people. Given the history of successful cooperation with NGOs, they shall be considered as key partners.

70. Ill health keeps the poor in poverty, reduces their ability to produce food or earn money, and leads them into indebtedness. Major health shocks often result in the sale of land and other assets, and reduce further the ability to cope. Women are generally most prone to ill health given the stress of child-bearing and the raising of children. In the Tonle Sap basin, waterborne and water-related diseases associated with lack of sanitation and safe drinking water, e.g., cholera, diarrhea, and malaria, are endemic and cause morbidity, particularly among children. Interventions to improve health in the Tonle Sap basin will support the objectives of Cambodia's Health Sector Strategic Plan (2003–2007), which aims to (i) increase health financing, (ii) widen coverage through improvements in the public health system



“And I have ordered in whatever forest people are collecting resin, don't cut it...Move quickly to give people ownership rights in this concession area, so that concessionaires don't violate people's rights. One part must be saved for people, and made as reserve forest, or reserve land, and we will create a community forest.”

Source: The Prime Minister's inaugural speech for the Tumring Hun Sen School, 29 August 2001.

and public-private partnerships, (iii) develop the institutional framework, (iv) improve the quality of sector services, (v) expand activities to prevent HIV/AIDS, and (vi) build health care skills. This is expected to step up achievement of the United Nations Millennium Declaration (2000), with its key focus on health. In the Tonle Sap basin, particular attention will be given to ensuring access to clean water and sanitation for the floating and mobile communities on and around the lake, as well as to meeting their special needs for health services. Throughout, ADB will again build on past successes in cooperation with NGOs: history shows that the quality and coverage of health services is better, by almost any measure, when NGOs are contracted to deliver them.

Crosscutting Themes

Vulnerable Groups

71. Vulnerable groups include widows and female heads of households, the physically and mentally handicapped, the orphaned, landless, and the aged with no young to support them. Many demobilized soldiers also seek to reintegrate into the communities. The burden of poverty has fallen disproportionately on women, particularly when they head households or have no male labor. Since they play a vital role in agriculture and an even greater role in fisheries, poverty cannot be reduced unless policies and programs address the situation of women. Therefore, the strategy intends in particular to reduce gender-based disparities and improve gender equity in credit, health, education, access to natural resources, socioeconomic and political empowerment, and legal protection. The Tonle Sap also has a sensitive ethnic dimension, and interventions will also seek to ensure that the stake of the Vietnamese and Cham minorities is considered.

Governance

72. Poor governance constrains, retards, and distorts development and has a disproportionate impact on the weaker sections of society. The most vulnerable victims of inefficient and inadequate social sector spending and ill-designed social sector programs are the poor. Inaccessible, unpredictable, and inefficient legal systems also discriminate against them. Similarly, corruption often affects the weakest groups in society the most. To improve governance, it is necessary to empower communities, individuals, and groups so that they can participate in decisions that affect their lives and interests. In Cambodia, the trend toward greater devolution of government services and participation by stakeholders offers the promise of more inclusive

development. Therefore, the strategy will support Cambodia's Governance Action Plan 2001 through deconcentration and decentralization initiatives and incorporation of key legislation governing security of public access to natural resources.

Resource Cooperation

73. Regional cooperation around natural resource issues in the Mekong River basin has been tempered by the mixed motivations of individual countries. Ultimately, however, it is knowledge and appreciation of the Mekong River basin's natural wealth that will drive regional governance efforts to sustain its health for the good of all people. Many see issues, such as shared waters, as the first vehicle for cooperation that can be extended into other areas. The strategy takes a basin-wide approach and will encourage emergence of a Mekong basin vision. To this intent, it will disseminate knowledge as widely as possible and contribute to greater recognition of the importance of water and related natural resources and the need to develop them in ways that are sustainable. Whenever possible, interventions will build on MRC's efforts to ensure harmonious cooperation among its four signatory countries.

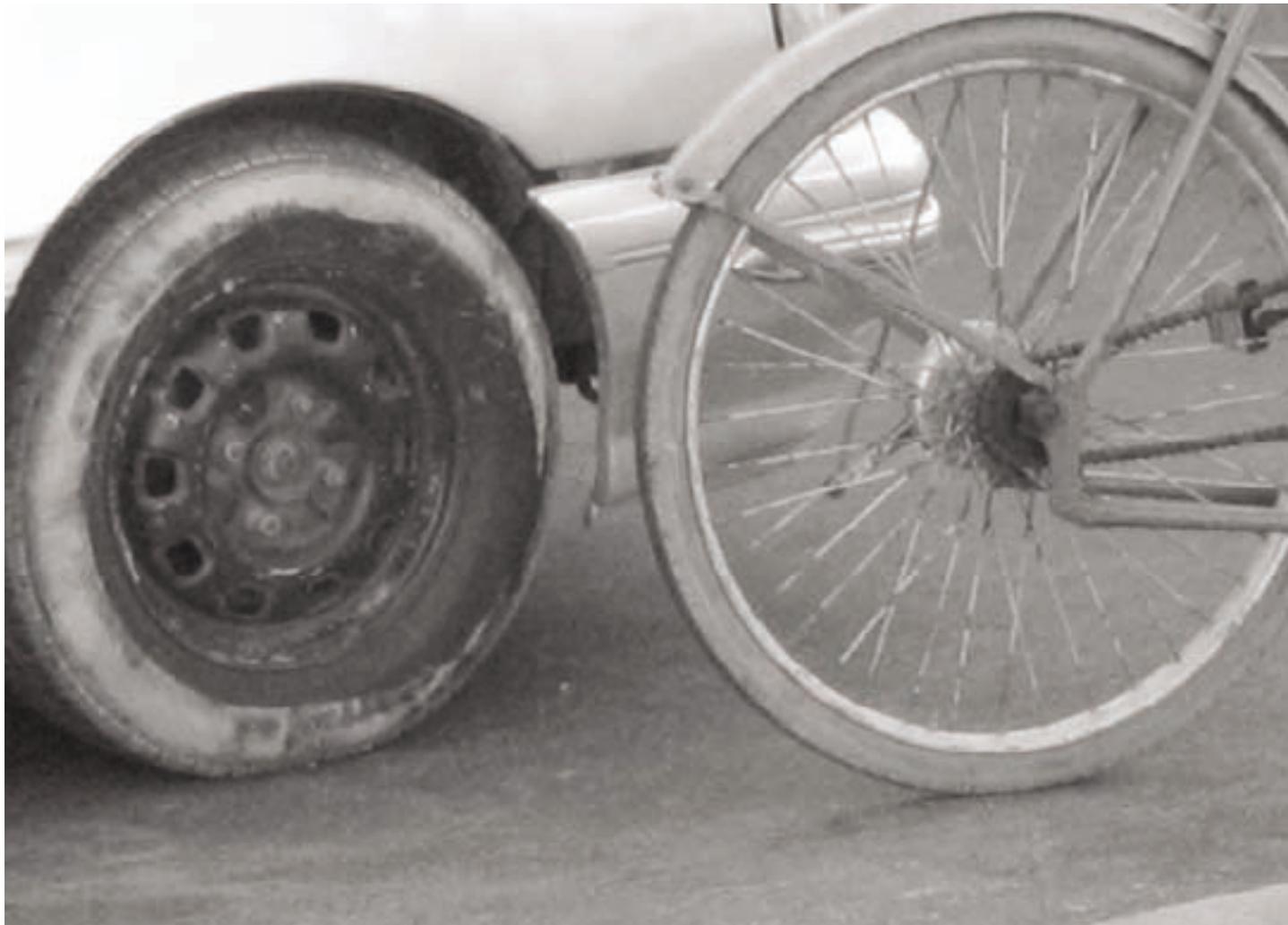
The Private Sector in Development

74. The private sector can play a key role in reducing poverty by providing growth opportunities and creating employment. In the Tonle Sap basin, significant private sector growth has taken place in the tourism sector over the past few years and this trend is expected to continue. Additional opportunities may exist in pro-poor, value-adding private sector activities to develop natural resources. The strategy supports creation of small and medium enterprises (including microenterprises). In parallel, it fosters the legal environment, market information systems, and financial services required.

Financing the Operational Program

75. Lending operations will constitute, by far, the bulk of ADB assistance. However, with the strategy focusing on effective institutions and policies as well as on broad-based development and regional cooperation, sufficient grant funding must also be ensured. ADB will need to actively seek additional sources of financing, in particular, through partnerships on its strategic agenda with regional institutions, bilateral agencies, and possibly private foundations. In addition to resources to finance lending and technical assistance operations, demands on administrative

resources are likely to increase as, in spite of selectivity and concentration, assistance programs will become more staff and skills intensive. Finally, enhancing the quality of ADB assistance and fully utilizing its potential by making it an informing and listening organization will also have a cost in terms of staff resources and time, as well as training programs. But, the geographical focus on the Tonle Sap basin will lead to better use, targeting, and management of financial and human resources.



Abbreviations and Glossary

ADB

Asian Development Bank

CNMC

Cambodia National Mekong Committee

GMS

Greater Mekong Subregion

MRC

Mekong River Commission

NGO

nongovernment organization

TSBR

Tonle Sap Biosphere Reserve

UNESCO

United Nations Educational, Scientific, and Cultural Organization

Basin management. Planning and managing natural resources on the basis of catchment or basin units. The advantages of the basin management approach stem from the fact that natural resources, including surface water and groundwater, natural vegetation, soils, and biodiversity, do not recognize interjurisdictional boundaries: natural resource management decisions in one part of a catchment or basin can have significant impacts elsewhere. Increasingly, overall responsibility for resource management is given to a basin organization constituted to take on this role, or to play a major part in it. Such organizations are arms of the government but transcend administrative boundaries and sometimes international borders. The Tonle Sap basin includes all or part of 8 of Cambodia's 24 provinces, and covers 80,000 square kilometers (44% of Cambodia's total area), including the Tonle Sap. The provinces are Banteay Meanchey, Battambang, Kompong Chhnang, Kompong Thom, Oddar Meanchey, Preah Vihear, Pursat, and Siem Reap.

Biological diversity. The Convention on Biological Diversity (1992), defines biological diversity as the variability among living organisms from all sources, including among others, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part; the term includes diversity within species, between species, and of ecosystems.

Biosphere reserves. Areas of terrestrial, marine, and other aquatic ecosystems, or a combination thereof, that are recognized internationally within the framework of the Man and the Biosphere Programme of the United Nations Educational, Scientific, and Cultural Organization (UNESCO). Biosphere reserves are nominated by governments and remain under their jurisdiction. The reserves must meet a minimal set of criteria and

adhere to a minimal set of conditions before being admitted to UNESCO's World Network of Biosphere Reserves. Each reserve is intended to fulfill three complementary functions:

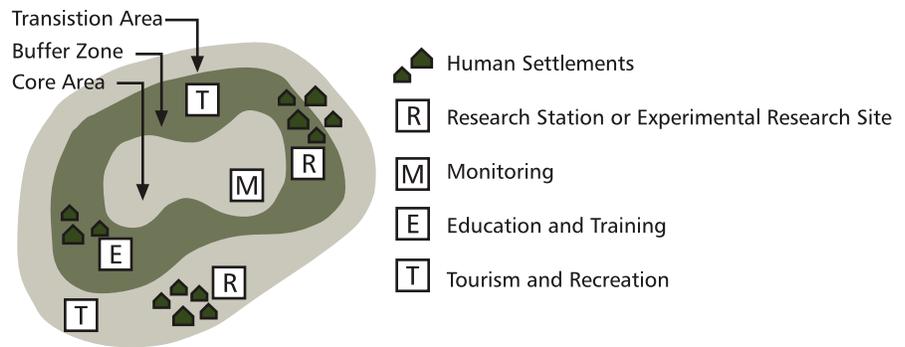
(i) a conservation function (preserve landscapes, ecosystems, species, and genetic variation); (ii) a development function (foster sustainable economic and human development); and (iii) a logistic function (support demonstration projects; environmental education and training; and research and monitoring related to local, national, and global issues of conservation and sustainable development). Biosphere reserves contain one or more core areas, which are securely protected sites; a clearly identified buffer zone; and a flexible transition area.

Buffer zone. A zone that usually surrounds or adjoins core areas, and is used for cooperative activities compatible with sound ecological practices, including environmental education, recreation, ecotourism, and applied and basic research. In the Tonle Sap Biosphere Reserve (TSBR), the buffer zone—an area of about 540,000 hectares (ha)—surrounds the core areas up to the outer limit of the flooded forest.

Community management. The community-based management of local natural resources, with support from relevant authorities, institutions, and organizations.

Core areas. Securely protected sites for conserving biodiversity, monitoring minimally disturbed ecosystems, and undertaking nondestructive research and other low-impact uses, such as education. In the TSBR, the core areas—located in Prek Toal, Boeng Tonle Chhmar, and Stung Sen—are characterized by a preserved flooded forest, rich river systems, and biodiversity. Nearly 100 waterbird species are found there, a dozen of which are of global significance. In addition to fish stocks, the areas are known for species, such as crocodiles, turtles, macaques, capped langurs, otters, and water snakes.

Biosphere Reserve Zonation



Source: UNESCO. 2004. The MAB Programme (www.unesco.org).

Fishing lots. Fishing lots are exclusive geographic areas that are awarded through a competitive public bidding system for a period of 2 consecutive years, with the auction fee payable for each of the two fishing seasons. (In 2000, there were 175 fishing lots throughout Cambodia, with size ranging from 2,000 to 50,000 ha.) They may include lake areas, river areas, and flooded forest. The largest are found on the Tonle Sap. The operator of each lot has the right to harvest fish according to the burden book for the lot. The burden book describes the open season, payment schedule, permissible fishing gear, boundaries, main geographic features, and designated public fishing areas. More than half of the fishing lot area was withdrawn from the system recently and designated for community-based management.

Flooded forest. A descriptive term for the particular natural vegetation that originally covered most of the Tonle Sap floodplain. It is now characterized by seasonally flooded low forest and shrubs that still account for the productivity of the Tonle Sap.

Transition area. An area in which existing stakeholders work together in a variety of economic and other activities to manage and develop sustainably a biosphere reserve's natural resources. In the TSBR, the transition area of about 900,000 ha lies between the outer boundary of the buffer zone and Highways No. 5 and No. 6.

Appendixes



The Value of Wetlands

Value	Lakes	Estuaries (without mangroves)	Mangroves	Open Coasts	Floodplains	Freshwater Marshes	Peatlands	Swamp Forests
Functions								
Groundwater Recharge	■	○	○	○	■	■	●	●
Groundwater Discharge	●	●	●	●	●	■	●	■
Flood Control	■	●	■	○	■	■	●	■
Shoreline Stabilization Erosion Control	○	●	■	●	●	■	○	○
Sediment/Toxicant Retention	■	●	■	●	■	■	■	■
Nutrient Retention	●	●	■	●	■	■	■	■
Biomass Export	●	●	■	●	■	●	○	●
Storm Protection/Windbreak	○	●	■	●	○	○	○	●
Microclimate Stabilization	●	○	●	○	●	●	○	●
Water Transport	●	●	●	○	●	○	○	○
Recreation/Tourism	●	●	●	■	●	●	●	●
Products								
Forest Resources	○	○	■	○	●	○	○	■
Wildlife Resources	●	■	●	●	■	■	●	●
Fisheries	■	■	■	●	■	■	○	●
Forage Resources	○	●	●	○	●	●	○	○
Agricultural Resources	●	○	○	○	■	●	●	○
Water Supply	■	○	○	○	●	●	●	●
Attributes								
Biological Diversity	■	■	●	●	■	●	●	●
Uniqueness to Culture or Heritage	●	●	●	●	●	●	●	●

Key: (○) Absent or exceptional; (●) present; (■) common and important value of that wetland type.

Source: Dugan, P.J. (Ed.). 1990. Wetland Conservation: A Review of Current Issues and Required Action. Gland, Switzerland: IUCN.

The Tonle Sap at a Glance

Item	Characteristic
Area	<ul style="list-style-type: none"> ■ 250,000–300,000 ha in the dry season ■ 1.0–1.6 million ha in the wet season
Hydrology	<ul style="list-style-type: none"> ■ 1–2 m amsl in the dry season ■ 8–11 m amsl in the wet season ■ 20% of the Mekong River’s floodwaters are absorbed by the Tonle Sap ■ 62% of the Tonle Sap’s water originates from the Mekong River ■ 38% of the Tonle Sap’s water originates from the Tonle Sap basin ■ The Tonle Sap is connected to the Mekong River by the 100-kilometer long Tonle Sap River, which reverses its flow seasonally
Biology	<ul style="list-style-type: none"> ■ The flooded forest contains about 200 plant species ■ The flooded forest extended over more than 1 million ha originally, 614,000 ha in the 1960s, and 362,000 ha in 1991 ■ The Tonle Sap contains at least 200 species of fish, 42 species of reptiles, 225 species of birds, and 46 species of mammals
Socio-economy	<ul style="list-style-type: none"> ■ 1.2 million people live in the area bordered by Highways No. 5 and No. 6 ■ The Tonle Sap yields about 230,000 tons of fish per annum (about 50% of Cambodia’s total freshwater capture fisheries production) ■ Rice production in the Tonle Sap floodplain makes up about 12% of Cambodia’s total

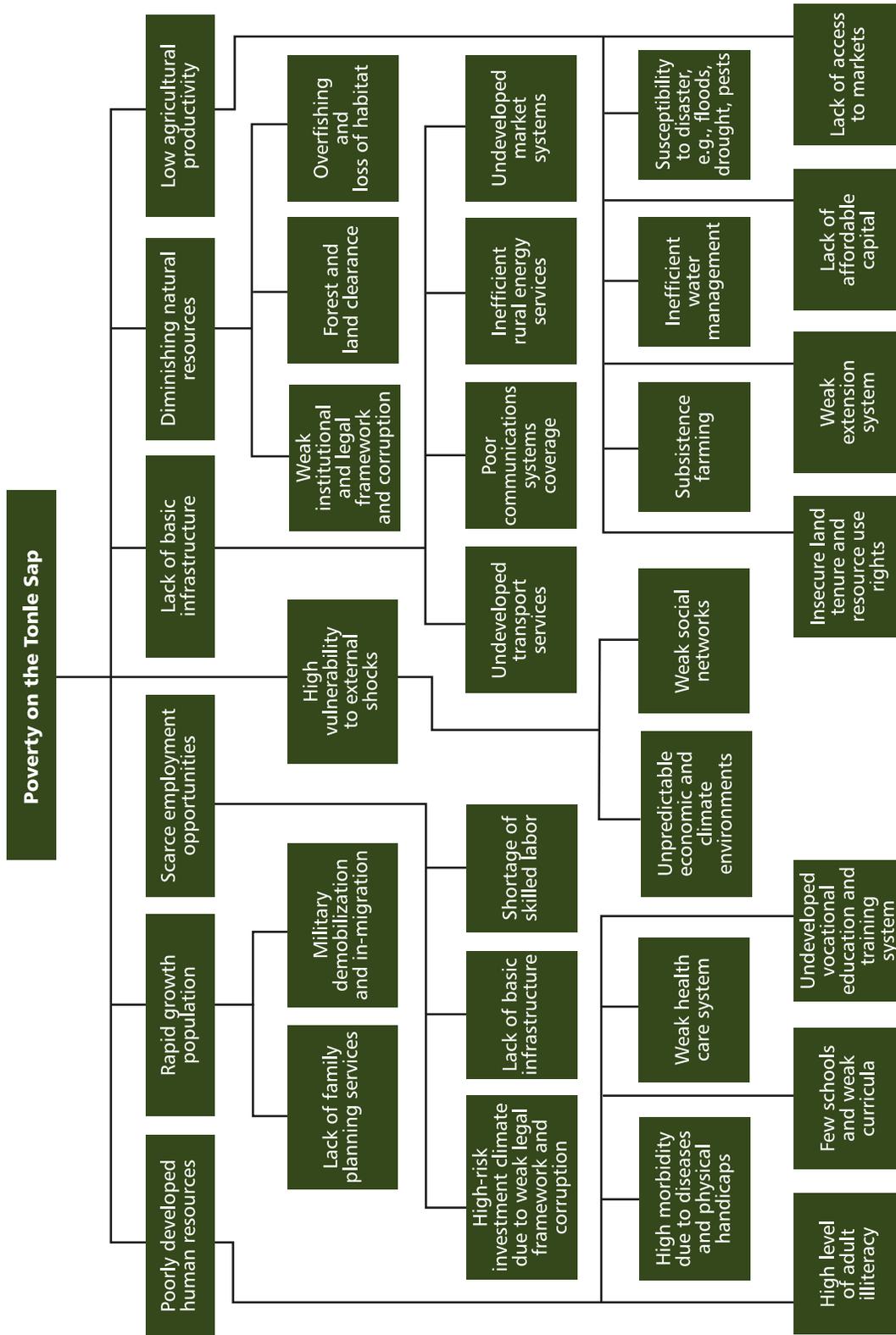
ha = hectares, m amsl = meters above mean sea level
 Source: ADB.

Causes of Wetland Loss

Cause	Lakes	Estuaries	Open Coasts	Floodplains	Freshwater Marshes	Peatlands	Swamp Forests
Direct Human Actions							
Drainage for Agriculture, Forestry, and Mosquito Control	●	■	■	■	■	■	■
Dredging and Stream Channelization for Navigation and Flood Protection	○	■	○	○	●	○	○
Filling for Solid Waste Disposal, Roads, and Commercial, Residential, and Industrial Development	●	■	■	■	■	○	○
Conversion for Aquaculture/Mariculture	●	■	●	●	●	○	○
Construction of Dykes, Dams, Levees, and Seawalls for Flood Control, Water Supply, Irrigation, and Storm Protection	■	■	■	■	■	○	○
Discharges of Pesticides, Herbicides, Nutrients from Domestic Sewage, and Agricultural Runoff and Sediment	■	■	■	■	■	○	○
Mining of Wetland Soils for Peat, Coal, Gravel, Phosphate, and Other Materials	■	●	●	●	○	■	■
Groundwater Abstraction	○	○	○	●	■	○	○
Indirect Human Actions							
Sediment Diversion by Dams, Deep Channels, and Other Structures	○	■	■	■	■	○	○
Hydrological Alterations by Canals, Roads, and Other Structures	■	■	■	■	■	○	○
Subsidence Due to Extraction of Groundwater, Oil, Gas, and Other Minerals	○	■	●	■	■	○	○
Natural Causes							
Subsidence	●	●	●	○	○	●	●
Sea-Level Rise	○	■	■	■	○	○	■
Drought	●	■	■	○	■	●	●
Hurricanes and Other Storms	○	■	■	●	○	●	●
Erosion	○	■	■	■	○	●	○
Biotic Effects	■	○	○	■	■	○	○

Key: (○) Absent or exceptional; (●) present, but not a major cause of loss; (■) common and important cause of wetland degradation and loss.
 Source: Dugan, P.J. (Ed.). 1990. Wetland Conservation: A Review of Current Issues and Required Action. Gland, Switzerland: IUCN.

Poverty on the Tonle Sap



The Needs of the Poor Ranked in Order of Frequency Cited

Need	Mekong Plain	Tonle Sap Region	Coastal Region	Northeastern Mountain Region
Food Security				
Draft Animals	1	1	1	1
Food-for-Work	2	2	1	2
Resettlement	3	3	3	4
Farm Implements	4	4	2	3
Cheap Rice Credit	5	6	4	5
Mine Clearance	7	5	–	–
Safety Net	6	–	–	5
Rice Rations	–	–	–	5
Social Infrastructure				
Health Care	1	2	1	1
Wells	2	1	2	2
Education	3	3	3	3
Latrines	4	3	4	4
Mosquito Nets	5	4	5	3
School Texts	–	5	–	4
Physical Infrastructure				
Irrigation	1	2	2	1
Farm-to-Market Roads	2	1	1	2
Reclaimed Land	3	3	3	3
Ponds	4	4	–	5
Electricity	5	–	–	4
Livelihood Issues				
Technical and Vocational Education and Training	1	1	1	1
Job Creation	3	3	2	4
Market Support	4	2	3	2
Lower Fuel Prices	2	4	3	4
Investment Promotion	5	4	–	3
Agricultural Needs				
Cheap Agricultural Inputs	1	2	2	2
New Technologies	2	1	1	1
High-Yielding Varieties of Rice	3	4	–	3
Pumps	5	3	–	4
Pesticides	4	5	–	5
Tractors	6	6	3	5
Animal Health	6	7	–	–
Rice Mills	7	–	–	6
Agroforestry	–	–	–	6
Threshing Machines	7	–	–	–
Good Governance				
Demarcation of Fishing Grounds	1	1	2	1
Teacher Transparency	2	–	1	–
Lower Fishing Taxes	3	–	–	–
Fewer Arrests	3	–	–	–

Source: ADB. 2001. Participatory Poverty Assessment: Cambodia. Manila

Characteristics and Resources of the Tonle Sap Basin Provinces

Province	Characteristic and Resource
Banteay Meanchey	■ Lowlands suitable for agriculture
Battambang	■ Lowlands suitable for agriculture with irrigation potential; Pailin gem mining area on border with Thailand; wildlife sanctuary; core biodiversity area; Multiple-Use Protected Area ^a
Kompong Chhnang	■ Tonle Sap River transportation route; wide floodplain agricultural area; wildlife sanctuary; Multiple-Use Protected Area
Kompong Thom	■ Agriculture and irrigation; wildlife sanctuary; core biodiversity areas; Multiple-Use Protected Area
Oddar Meanchey	■ Sparsely populated; protected landscape
Preah Vihear	■ Sparsely populated; historic and cultural attractions; wildlife sanctuary
Pursat	■ Mountainous with hydropower potential; productive forests; wildlife sanctuaries; Multiple-Use Protected Area
Siem Reap	■ Angkor Wat and other historical and cultural attractions; Chong Kneas harbor for water transport to and from Phnom Penh; wildlife sanctuary; national park; Multiple-Use Protected Area

^a In recognition of the Tonle Sap's importance, a Royal Decree designated it as a Multiple-Use Protected Area in November 1993.

Source: ADB.

Tonle Sap Catchment Storage Potential

Catchment Name	Province	Storage Potential (mcm)	
		Gross	Net
Stung Baribo	Kompong Chhnang, Pursat	–	–
Stung Pursat	Pursat	1,685	580
Stung Dauntri	Pursat, Battambang	–	–
Stung Sangker	Battambang	–	–
Stung Battambang	Battambang	1,290	1,150
Stung Mongkol Borey	Battambang, Banteay Meanchey, (Thailand)	140	115
Stung Sreng	Siem Reap, Banteay Meanchey, Oddar Meanchey	660	610
Stung Siem Reap	Siem Reap	–	–
Stung Chikreng	Siem Reap	170	160
Stung Staung	Kompong Thom, Preah Vihear	590	550
Stung Sen	Kompong Thom, Preah Vihear	3,700	2,900
Stung Chinit	Kompong Thom, Kompong Chhnang	500	390

mcm = millions of cubic meters.

Source: United Nations Development Programme.

Operating Framework



Cross-Impact Strategy Matrix

		Core Area of Intervention		Crosscutting Theme			
		Rural Development and the Environment	Human Development	Vulnerable Groups	Governance	Resource Cooperation	The Private Sector in Development
Development Objective	Pro-Poor, Sustainable Economic Growth						
	Access to Assets						
	Management of Natural Resources and the Environment						

For more information on the Tonle Sap Initiative,
please contact

Urooj Malik, Director
Olivier Serrat, Senior Project Economist
Agriculture, Environment, and Natural Resources Division
Mekong Department
Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
Tel +63 2 632 6175
Fax +63 2 636 2231
oserrat@adb.org
www.adb.org/projects/tonle_sap/

Shyam Bajpai, Country Director
Paulin Van Im, Project Implementation/Program Officer

Cambodia Resident Mission
93/95 Preah Norodom Blvd.
Sangkat Boeung Raing
Khan Daun Penh, Cambodia
P.O. Box 2436
Tel +855 23 215805, 215806
Fax +855 23 215807
adbcarml@adb.org
www.adb.org/carm

About ADB

The Asian Development Bank (ADB)'s work is aimed at improving the welfare of the people of the Asia and Pacific region, particularly for the 1.2 billion who live on less than \$2 a day. Despite the success stories, Asia and the Pacific remains home to two thirds of the world's poor.

ADB is a multilateral development finance institution owned by 63 members, 45 from the region and 18 from other parts of the globe. ADB's vision is a region free of poverty. Its mission is to help its developing member countries reduce poverty and improve their quality of life.

ADB's main instruments in providing help to its developing member countries are policy dialogues, loans, technical assistance, grants, guarantees, and equity investments. ADB's annual lending volume is typically about \$6 billion, with technical assistance provided usually totaling about \$180 million a year.

ADB's headquarters is in Manila. It has 26 offices around the world. The organization has more than 2,000 employees from over 50 countries.

Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
Tel +63 2 632 4444
Fax +63 2 636 2444
www.adb.org
Publication Stock No. 050105

Printed in the Philippines