WWF

REPORT

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2012

ADB

ECOLOGICAL FOOTPRINT AND INVESTMENT IN NATURAL CAPITAL IN ASIA AND THE PACIFIC

WWF
WWF is one of the world's largest and most experienced independent conservation organizations, with over 5 million supporters and a global Network active in more than 100 countries.

WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption.

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

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

Global Footprint Network
The Global Footprint Network promotes the science of sustainability by advancing the Ecological Footprint, a resource accounting tool that makes sustainability measurable. Together with its partners, the Network works to further improve and implement this science by coordinating research, developing methodological standards, and providing decision makers with robust resource accounts to help the human economy operate within the Earth's ecological limits.

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In Terai, Nepal, the land was previously grazed on, leaving it barren and bereft of life. Through sustainable management the area has now been regenerated

FOREWORD

The Asia and Pacific region has some of the largest and most diverse ecosystems on earth. The Coral Triangle boasts an astonishing 3,000 species of fish and harbours 76% of the world's coral species.

The widespread loss of natural ecosystems and biodiversity is much more than a conservation issue. Natural ecosystems provide socially and economically valuable services – such as food and fiber resources, clean water and climate regulation – that are fundamental to human welfare, but are often overlooked in decision-making processes

In the Greater Mekong Subregion (GMS), 1,200 new species have been discovered in the past 20 years, while on the island of Borneo, scientists have discovered 600 new species in that same time span. The Himalayan mountain range is another biodiversity hotspot with an incredible spectrum of flora and fauna, and the Eastern Himalayas are the source of freshwater for one billion people in the region.

Despite the rich natural capital in the region, this report reveals that biodiversity is in decline in all types of ecosystems, including in forests, rivers and oceans, with the rate of species loss about twice the global average. Furthermore, data presented on ecological footprints and biocapacities shows that the Asia and Pacific region has a "biocapacity deficit". This means that countries in the region use more biologically productive land and sea to support the consumption of food, fibre and energy, as well as to build infrastructure and absorb carbon dioxide emissions, than is available within the region. This shortfall can only be made up by importing natural resources or by continuing to deplete natural capital, which has significant economic and environmental implications, including rising commodity prices and worsening degradation of natural resources.

The loss of natural capital in the region is the result of numerous factors associated with human activity. These range from the clear cutting of primary forests to make way for plantations and agricultural land to the dynamiting of coral reefs to catch fish. In Borneo, for instance, an average of 850,000 hectares of forest has disappeared every year over the last 25 years. Similarly, deforestation has been a major issue in the GMS, with 8.5 million ha lost between 1990 and 2005. In the last 40 years, the Coral Triangle has lost 40% of its coral reefs, and 80% of the spawning aggregations of reef fish has disappeared or declined. Meanwhile, among many other impacts, climate change is accelerating the melting of glaciers in the Himalayan region, threatening regional water and energy security and raising concerns regarding disaster impacts.

60

THE LOWER MEKONG BASIN PROVIDES WATER, FISH AND OTHER NATURAL RESOURCES FOR OVER 60 MILLION PEOPLE

The widespread loss of natural ecosystems and biodiversity is much more than a conservation issue. Natural ecosystems provide socially and economically valuable services – such as food and fibre resources, clean water and climate regulation – that are fundamental to human welfare, but are often overlooked in decision-making processes. For example, more than 120 million people in the Coral Triangle depend directly on local marine and coastal resources for their income, livelihoods, and food security, while international fisheries exports from the region are estimated to be worth more than $3 billion a year. In the GMS, the Lower Mekong Basin provides water, fish and other resources for over 60 million people. The economic value of capture fisheries in the Mekong River basin alone is estimated to be between $1.4 and $3.9 billion per year.

Clearly, greater focus is needed to ensure that the region's "natural capital" is maintained to support long-term social and economic prosperity. Protecting natural capital will require clear vision, careful stewardship, and tangible investments, to ensure effective protection, management, and wise use of the regions precious resources. We must approach the issues on multiple levels. At the regional level, support for multi-country conservation programs is needed to reflect the fact that large-scale ecosystems are public goods that cut across national boundaries and require coordinated regional approaches. On the national level, it will be important to encourage development processes that are orientated towards "green growth" while supporting the enforcement of the many environmental laws that have been adopted by nations in the Asia -Pacific region. And on the local level, it is important to support appropriate incentives that encourage businesses and communities to protect natural capital and maintain the whole range of invaluable services that it provides.

As the ultimate driver of resource use, consumption patterns must also be addressed. Creating and expanding markets that reward and ultimately demand sustainable practices, such as through product certification schemes, will allow buyers to make more responsible choices. Whether those buyers are diners in seafood restaurants in Hong Kong, China or supermarket chains in North America, they can, through their decisions, send a signal to the marketplace.

In this report, you will find examples of promising approaches for sustainably managing natural capital in this region. These are based on experiences from a number of important regional cooperation initiatives, including the Heart of Borneo Initiative, the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security, the Greater Mekong Subregion Core Environment Program, and the Living Himalayas Framework for Cooperation. The four initiatives demonstrate the commitment of the participating governments to protecting the integrity of natural ecosystems while improving livelihoods and reducing poverty. Looking forward and beyond the "Rio+20" United Nations Conference on Sustainable Development in June 2012, these initiative can provide valuable lessons on how we can support large scale ecosystem management in the region. Working together with a wide range of partners, ADB and WWF stand ready to assist developing countries in the region to make inclusive and environmentally sustainable growth a reality.

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River in the valley near Pheriche, Everest region, Himalayas, Nepal

ACKNOWLEDGEMENTS

ADB and WWF signed a Memorandum of Understanding in 2001 to help countries in the Asia and Pacific region make a transition to environmentally sustainable growth. Since then we have broadened and deepened our collaboration through a growing number of high profile and critically needed environment and natural resource management initiatives across the region. This report is one of the latest joint products under the ADB and WWF partnership.

We are very grateful to members of our joint ADB/WWF team who helped coordinate the preparation of the report and provided significant inputs: WWF: Tariq Aziz, Thuy Trang Dang, Jacques Ferreira, Marc Goichot, Monique Grooten, Kyle Hemes, Jose Ingles, Richard Leck, Paolo Mangahas, Geoffrey Muldoon, Anna van Paddenburg, Lida Pet-Soede, Keith Symington, Gokaran Jung Thapa, Jackie Thomas, Adam Tomasek, Aaron Vermeulen; ADB: Jeffrey Bowyer, Bruce Dunn, Kotaro Kawamata. In addition, significant contributions to the report were made by the Global Footprint Network (GFN): Gemma Cranston and Mathis Wackernagel; and TierraMar Consulting: Annisa Lawrence and Raymond C. Nias. The report was edited by Marion Canute. The layout was prepared by Louise Clements.

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EXECUTIVE SUMMARY

Maintaining natural capital such as forests, biodiversity, freshwater, and coastal and marine ecosystems is essential to making "green economies" a reality. Natural capital is the stock of natural assets and resources that provide ecosystem services, such as food, water, timber, pollination of crops and absorption of human waste products like carbon dioxide.

The challenge for countries of Asia and the Pacific is to manage their natural capital sustainably, so that they maintain these services in the interests of long-term development. Maintaining natural capital is particularly critical for the rural poor, whose livelihoods and ability to cope with natural disasters directly depend on the availability of local natural assets and resources.

28%

BETWEEN 1970 AND 2008 THE LIVING PLANET INDEX HAS DECLINED BY ALMOST 28% GLOBALLY

In countries of Asia and the Pacific, the gap between the Ecological Footprint, or the demand for natural resources, and the environment's ability to replenish those resources, or its biocapacity, is widening. For the last 35 years, global demand on natural capital has exceeded the ability of many ecosystem services to regenerate. In Asia and the Pacific, each person currently uses an average of 1.6 global hectares (gha) of biologically productive area of land or sea annually for their consumption needs. However, only 0.9 gha of biocapacity is available per person in the region. The shortfall (0.8 gha per person) represents a "biocapacity deficit" that can only be made up by importing natural resources or by continuing to deplete natural capital. This deficit has significant economic and environmental implications, including rising commodity prices and shortages of key resources.

In the past two decades, the state of ecosystems in Asia and the Pacific has been declining. Conversion of primary forests to agricultural land or monoculture plantations has resulted in a marked decrease in so called "old growth" forests that are more biologically diverse. Old growth forests and other types of ecosystems provide essential services such as carbon storage and clean water. Extensive coastal development and unsustainable exploitation of marine resources have resulted in the destruction of many major coastal habitats, including corals, mangroves, seagrasses, wetlands and salt marshes. Freshwater ecosystems have been converted for agricultural use and polluted with agricultural and urban waste, and their natural flow has been disrupted by water storage for agriculture, domestic use and hydropower. This has resulted in lower

Loading harvested mangrove poles into a boat, Malaysia

agricultural yields, declining freshwater fish stocks, and reduced access to clean drinking water.

One of the most widely used indicators for tracking the state of biodiversity around the world is the Living Planet Index (LPI), which can be regarded as an indicator of the health of the planet's ecosystems. Between 1970 and 2008 the global LPI fell by almost 30%. In the Indo-Pacific region, the LPI shows an even greater decline of 64% in key populations of species over the same period.

This report looks in more detail at the state of key ecosystems in Asia and the Pacific and what can be done to sustain them. In particular the report focuses on four major regions where cooperative action to safeguard ecosystem services and natural resources is making a difference: the Heart of Borneo, the Coral Triangle, the Greater Mekong Subregion and the Eastern Himalayas. In these subregions, the web of ecosystems provides income and livelihoods for millions of people and is worth billions of dollars annually in exports and national income. The forested watersheds, biodiversity, and coastal and marine habitats also provide multiple services not currently valued in the marketplace or fully recognized by decision-making processes. As a result, changing consumption patterns and ever-growing demand for resources are putting these ecosystems under extreme pressure.

In the Heart of Borneo, an average of 850,000 hectares of forest is lost every year due to palm oil plantations, mining and timber production

In the Heart of Borneo, an average of 850,000 hectares of forest is lost every year due to palm oil plantations, mining and timber production. If this trend continues, by 2020, forest cover will drop to less than a third of what it was in 1950. In the Coral Triangle, over 40% of the coral reefs and mangroves of the region have disappeared over the last 40 years, resulting in declining fish stocks. In the Greater Mekong Subregion, economic development jeopardizes the connectivity between the important biodiversity hotspots in the region, and poorly planned hydropower projects could result in a drop in fish production of 150,000 to 480,000 tons per year in 2015 compared to year 2000 levels.

Increasingly however, governments, businesses and communities are working together in these areas to protect biodiversity and ecosystems, allowing countries to maintain and increase the economic and social benefits derived from their natural capital. In doing so, various approaches are emerging and show great promise in helping to maintain natural capital, while at the same time encouraging green growth and poverty alleviation. This report will explore a number of these approaches, including experiences from four regional initiatives and programs: the Heart of Borneo Initiative (HoB), the Coral Triangle

17%

TERRESTRIAL PROTECTED AREAS NOW COVER NEARLY 13% OF THE WORLD'S LAND SURFACE AND GOVERNMENTS AROUND THE WORLD HAVE RECENTLY COMMITTED TO EXPANDING THIS TO 17% BY 2020

Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF), the Greater Mekong Subregion Core Environment Program (GMS CEP) and related activities, and the Framework for Cooperation for a Living Himalayas. In particular the following four approaches are highlighted for their transformative potential:

Integrated strategic planning and management processes can be used effectively to ensure that opportunities for green growth are considered at an early stage in the policy or planning process. This requires participatory and cross-sectoral cooperation that considers the value of natural capital and opportunities to protect and share the economic and social benefits. In the GMS for instance, tools such as Strategic Environmental Assessment (SEA) and other related spatial planning and assessment processes have been successfully applied to consider green growth options and environmental and social safeguards for economic development corridors, hydropower plans and the tourism and energy sectors. Based on lessons learned, such processes are now being applied more widely and provide great promise for directing green and inclusive growth in the future.

Protected areas (PAs) are widely recognized as a cornerstone of conservation efforts and over one billion people – a sixth of the world's population – depend on protected areas for a significant percentage of their livelihoods. Terrestrial PAs now cover nearly 13% of the world's land surface and governments around the world have recently committed to expanding this to 17% by 2020. Marine protected areas currently cover less than 1% of the world's oceans' with a target of 10% set for 2020. As biodiversity continues to decline, the management effectiveness of PAs will need to be improved, along with their integration and linkage with the management of productive land and seascapes outside of PAs. Positive examples are emerging however. For example, under the CTI-CFF, countries in the Coral Triangle have identified a number of priority seascapes for collective management, and networks of marine protected areas are being planned.

Financial incentives and mechanisms to support investments in natural capital can provide cost-effective options for biodiversity conservation, poverty alleviation and economic development. For example, at a global level, it has been estimated that annual investment of $45 billion in conservation efforts would result in the protection of ecosystem services worth $5 trillion. To encourage such investments, better assessments of the economic and social value of ecosystems services area needed and various sustainable financing options need to be explored. This is particularly important for a number of low-income

Coral reef. Turtle Islands, Philippines

This report highlights major initiatives in four large-scale regional ecosystems in Asia and the Pacific that demonstrate how strategies for investing in natural capital and natural resources management are being developed and applied: the Living Himalayas, the Heart of Borneo (HoB), the Coral Triangle (CTI), and the Greater Mekong Subregion (GMS)

countries in the region, where the value of natural capital may exceed the value of produced capital and where national budgets may not be sufficient to provide direct budget support. Examples of such options include various payment for ecosystem services schemes (PES). Under a PES scheme, people involved in managing or protecting ecosystems that provide ecosystem services, such as vegetation in a watershed for example, are paid by those who benefit from the services. PES schemes can include approaches for "Reducing Greenhouse Gas Emissions from Deforestation and Forest Degradation" (widely known as REDD+), which aim to create a financial value for the carbon stored in forests and incentives for developing countries to reduce emissions from forested lands.

Sustainable business practices are an essential ingredient for green growth, and the private sector can generate innovative solutions and financial resources that can help sustain natural capital. For example, certification schemes that guarantee buyers that products have been sourced and produced sustainably can help protect natural capital while generating revenue and jobs from business. Sustainable palm oil production (through the Roundtable on Sustainable Palm Oil) and sustainably produced or harvested fish (through the Marine Stewardship Council) have gained a growing share of the global market at 13 % and 10 % respectively, and offer great promise in reducing the negative impacts of human consumption in areas with high biodiversity.

Figure 1: Four regional ecosystems covered by this report

The boundaries, colors, denominations, and any other information shown on the map do not imply any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries, colors, denominations, or information

INTRODUCTION: LINKING PEOPLE WITH THEIR PLANET

Plants, animals and microorganisms form complex, interconnected webs of ecosystems[1] and habitats, which in turn supply the ecosystem services upon which all human life depends (Box 1).

These underlying components of ecosystems can be regarded as natural capital: everything from coral reefs to forests and wetlands that produces goods and services consumed by humans and helps to regulate the global environment (Hawken, Lovins, and Lovins 2010).

Box 1. Ecosystem services
Ecosystem services are the benefits that people obtain from ecosystems, including:

- Provisioning services. Goods obtained directly from ecosystems (e.g., food, medicine, timber, fiber, biofuel);
- Regulating services. Benefits obtained from the regulation of natural processes (e.g., water filtration, waste decomposition, climate regulation, crop pollination, regulation of some human diseases);
- Supporting services. Regulation of basic ecological functions and processes that are necessary for all other ecosystem services (e.g., nutrient cycling, photosynthesis, soil formation);
- Cultural services. Psychological and emotional benefits gained from human relations with ecosystems (e.g., enriching recreational, aesthetic, and spiritual experiences). (Millennium Ecosystem Assessment 2005a)

All humans use ecosystem services and consume natural resources. However if the rate of consumption exceeds the rate at which natural systems can regenerate, natural capital is depleted. This means that the ecosystem services essential for economic development will also decrease, affecting people who directly rely on these resources, and potentially reducing a nation's income from exports and harming a nation's economic growth.

1 An ecosystem is a community of plants, animals and smaller organisms that live, feed, reproduce and interact in the same area or environment.

Young boy holding a Bagrid catfish, Tonle Sap River, Cambodia

26%

TIMBER AND OTHER NATURAL RESOURCES, MAKES UP 26% OF TOTAL WEALTH

Ecosystem Services and a Green Economy

All economies ultimately rely on goods and services derived from the natural environment. For low-income countries, these goods and services are especially important and are often directly linked to local natural capital. The World Bank (2006) calculated that in low-income countries, natural wealth in the form of agricultural land, timber, mineral deposits, and other natural resources makes up 26% of total wealth. This is a higher share than produced capital (16%), which can be defined as the sum of machinery, equipment, and structures (including infrastructure) and urban land.

The report on the Economics of Ecosystems and Biodiversity (TEEB 2010) estimates the annual global economic impact of the loss of biodiversity[2] at between $2 trillion–$4.5 trillion. However, the fact that losses in the natural world have direct economic consequences is systematically underestimated. There is also a lack of understanding about the importance of sustainably managing natural assets in efforts to reduce poverty. The rural poor are especially hard-hit by loss of natural capital because they rely on ecosystem services for direct benefits, such as flood protection, food, shelter and fuel.

The five greatest direct pressures that result in depletion of natural capital and loss of ecosystem services are identified in the World Wide Fund for Nature (WWF) Living Planet Report 2012 (WWF 2012) as follows:

Habitat loss, alteration, and fragmentation:	Mainly due to the conversion of land for agricultural, aquaculture, industrial or urban use; dams and other changes to river systems for irrigation, hydropower, or to regulate flow; and damaging fishing activities.
Over exploitation of wild species populations:	Harvesting of animals and plants for food, materials, or medicine at a rate above the ability of the population to reproduce.
Pollution:	Mainly from excessive use of pesticides and fertilizer in agriculture and aquaculture, urban and industrial effluents, and mining waste.
Climate change:	Due to rising levels of greenhouse gases in the atmosphere, caused mainly by the burning of fossil fuels, the clearing of forests, and industry.
Invasive species:	Introduced deliberately or inadvertently from one part of the world to another, they then become competitors, predators, or parasites of native species.

2 Biodiversity is the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are a part, including diversity within species, between species, and of ecosystems.

Most of these threats stem from human demand for food, water, energy and materials, as well as the need for land for towns, cities and infrastructure. The scale of the impact on biodiversity depends on three main factors: the total number of consumers, or population; the amount each person consumes; and the efficiency with which natural resources are converted into goods and services (WWF 2010a).

Most of these threats stem from human demand for food, water, energy and materials, as well as the need for land for towns, cities and infrastructure

Population and consumption in the Asia and Pacific region have increased rapidly. In addition, material intensity[3] in the region as a whole increased from 2000 to 2005, reversing previous trends (ADB, ESCAP, and UNEP 2012). The main reason for this reversal is that economic activity in the region, as well as in the rest of the world, is shifting away from relatively more efficient centers of production, such as Japan, to relatively more resource-intensive centers of production, such as the PRC. The enormity of this shift has been enough to affect regional and global efficiency trends, even as most economies, including the PRC itself, are becoming more efficient.

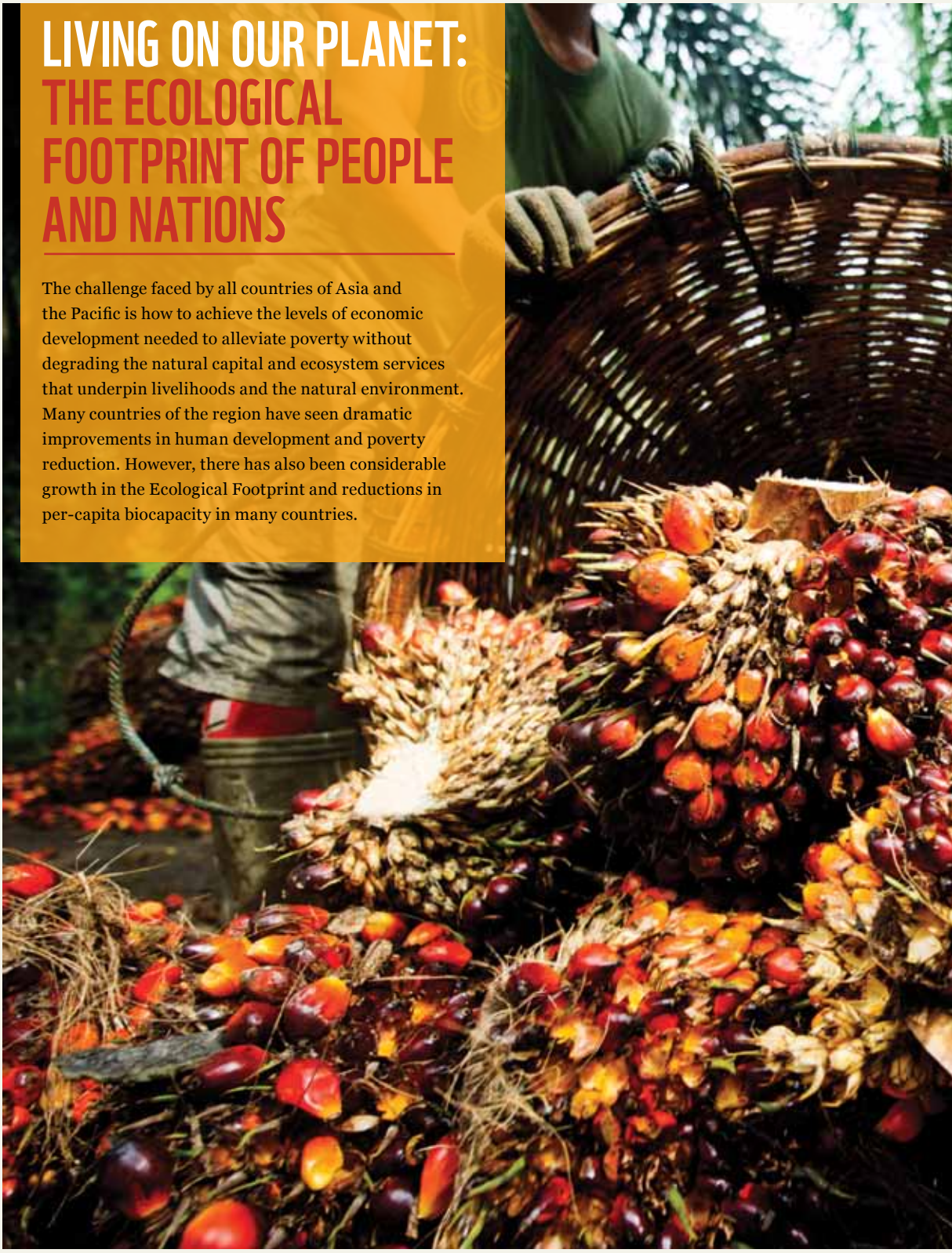
If these trends continue, pressures on the environment will increase even faster than the rapid rates of economic growth, and the negative impacts on the environment could disrupt the very processes that sustain life on this planet (ADB, UNESCAP, and UNEP 2012). For example, there may be limits or tipping points to the extent to which environmental processes can be disrupted before they break down. In the case of climate change, the rate of biodiversity loss, and changes in the global nitrogen cycle, recent analysis indicates these tipping points may have already been passed (Rockstrom et al. 2009).

Moving forward, society and economies must learn to appreciate the value of natural capital in order to pave the way for more targeted and cost-effective solutions to maintain that capital (United Nations Environment Programme [UNEP] 2009b). Maintaining natural capital can bring rich returns, such as the benefits associated with maintaining natural fresh water supplies as opposed to having to build expensive water treatment or desalinization plants. At a global level the economic benefits of such actions can be tremendous. For example, it has been estimated that an annual investment of $45 billion in conservation efforts would result in the protection of ecosystem services worth $5 trillion (TEEB 2010). The sustainable management of these natural assets can also help alleviate poverty (Turner et al. 2012; Pearce 2005), and can help poor, vulnerable communities better cope with natural disasters. Various ways to address this challenge will be more fully explored in the section on Regional Initiatives.

3 Material intensity is the quantity of material used to produce goods and services.

LIVING ON OUR PLANET: THE ECOLOGICAL FOOTPRINT OF PEOPLE AND NATIONS

The challenge faced by all countries of Asia and the Pacific is how to achieve the levels of economic development needed to alleviate poverty without degrading the natural capital and ecosystem services that underpin livelihoods and the natural environment. Many countries of the region have seen dramatic improvements in human development and poverty reduction. However, there has also been considerable growth in the Ecological Footprint and reductions in per-capita biocapacity in many countries.



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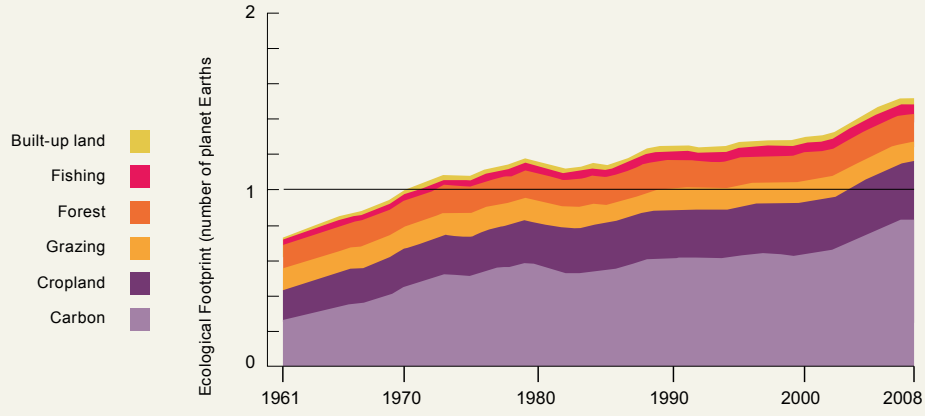
Currently the average citizen of the Asia and Pacific region uses 1.6 global hectares (gha) of biologically productive land and sea (also known as biocapacity) to support the consumption of food, fiber, timber, energy and space for infrastructure and to absorb their carbon dioxide emissions, while only 0.9 gha is available. For most countries this gap is widening. Overall, the biocapacity available per person in 2008 was two thirds of that available in 1960. In a world of diminishing resources, this growing deficit can only be partially offset by imports of natural resources from outside the region. Strategies will be needed that result in more sustainable use of biocapacity and greater efficiency in use of resources. Without such measures, a growing deficit in the region will result in further depletion of natural capital, loss of biodiversity, and loss of ecosystem services. For many of the rural poor, their access to natural capital is also at risk.

MEASURING OUR IMPACT ON THE NATURAL WORLD

The Ecological Footprint is an accounting framework developed by Global Footprint Network to measure the amount of biologically productive land and sea area that humanity needs to produce the resources it consumes, provide room for its infrastructure, and absorb its waste.

The current National Footprint Accounts (Global Footprint Network 2011) track a resources 'basket' that includes crops, fish for food as well as other uses, timber, and grass used to feed livestock. It also includes productive areas that are being used for urban and transport infrastructure. Carbon dioxide from the burning of fossil fuel is the only waste product currently included in national Footprint assessments (Figure 2). As people consume resources from around the world, the Ecological Footprint of consumption, measured in units called global hectares[4], adds these areas together regardless of where they are located on the planet.

Figure 2: Changes in the Global Ecological Footprint of Human Consumption Over Time Relative to Global Biocapacity (data Global Footprint network)



4 A productivity weighted area used to report both the biocapacity of the earth, and the demand on biocapacity (the Ecological Footprint). The global hectare is normalized to the area-weighted average productivity of biologically productive land and water in a given year.

The Ecological Footprint of nations has grown steadily, doubling since 1966 as human populations and per-capita consumption have grown (WWF 2010a). Globally, the Ecological Footprint started exceeding available biocapacity the early 1970s. The main reason for this global "overshoot" is the increase in the carbon component of the Footprint

CARBON UPTAKE FOOTPRINT	Calculated as the amount of forest land required to absorb CO_2 emissions from burning fossil fuels, land-use change and chemical processes, other than the portion absorbed by oceans
GRAZING LAND FOOTPRINT:	Calculated from the area used to raise livestock for meat, dairy, hide and wool products
FOREST FOOTPRINT:	Calculated from the amount of lumber, pulp, timber products and fuel wood consumed by a country each year
FISHING GROUNDS FOOTPRINT	Calculated from the estimated primary production required to support the fish and seafood caught, based on catch data for 1,439 different marine species and more than 268 freshwater species
CROPLAND FOOTPRINT	Calculated from the area used to produce food and fibre for human consumption, feed for livestock, oil crops and rubber
BUILT-UP-LAND FOOTPRINT:	Calculated from the area of land covered by human infrastructure, including transportation, housing, industrial structures, and resevoirs for hydropower

Figure 3: Components of the Ecological Footprint

ASIA PACIFIC

The Ecological Footprint of Asia and the Pacific is 1.6 gha per person, which is 60% below the global average of 2.7 gha per person. However, as shown in Figures 4 and 5, there is a wide disparity between people of different nations. For example, the per capita Ecological Footprint of Australia (the highest in the region at 6.7 gha per person) is 14 times larger than that of Timor-Leste (0.5 gha per person).

Figure 4: Showing per-person Ecological Footprint of People in Asia and the Pacific for 2008 (data Global Footprint network)

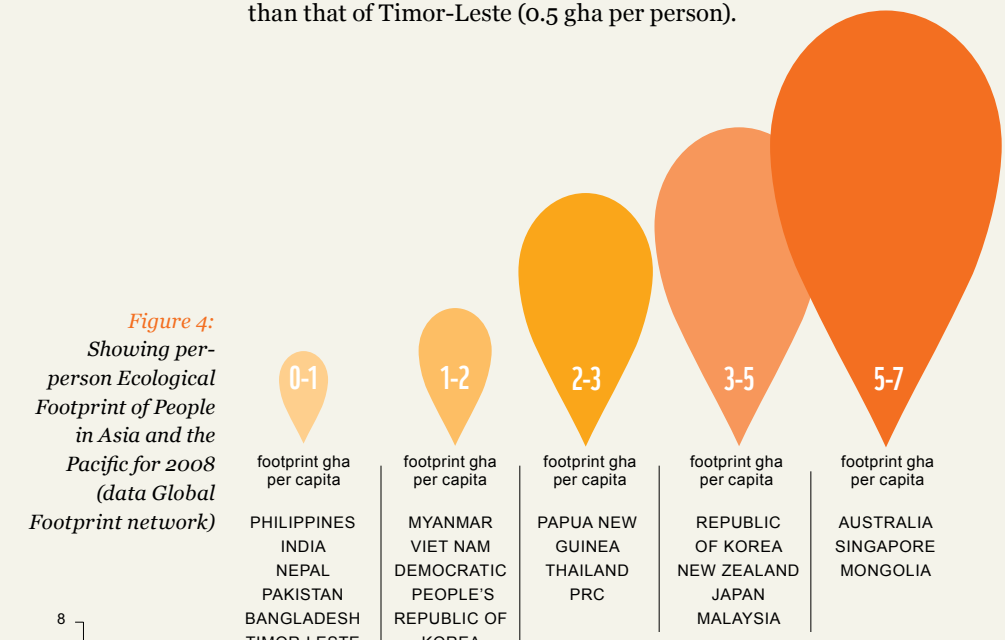
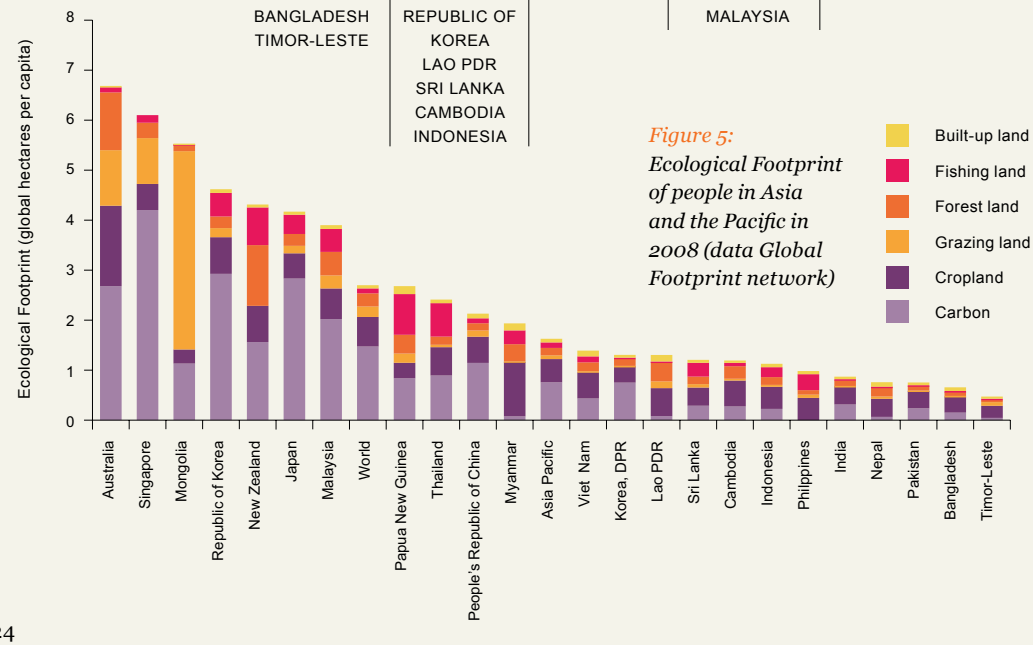


Figure 5: Ecological Footprint of people in Asia and the Pacific in 2008 (data Global Footprint network)



47%

THE CARBON COMPONENT REPRESENTS 47% OF THE ECOLOGICAL FOOTPRINT FOR THE ASIA PACIFIC REGION

The carbon component makes up 47% or more of the total Ecological Footprint. While the reasons for this vary from country to country, all relate to the land area needed to absorb the production of greenhouse gases from a combination of heavy industry and high energy consumption per capita.

The Ecological Footprint of an entire nation is calculated by multiplying the per-capita Footprint by population size. The national Ecological Footprints of the People's Republic of China (PRC), India, Indonesia and Japan together contribute more than three-quarters of the total Ecological Footprint of the Asia and Pacific region (Figure 6). The National Footprint of the PRC is the largest of all the countries of Asia and the Pacific, due to its large population.

The PRC and India are likely to experience the greatest absolute increase in Ecological Footprints by 2015, accounting for 37% of the projected total global increase. By order of magnitude, Japan, Indonesia, the Republic of Korea, Pakistan, and Australia are also projected to be in the top 20 countries globally by 2015. With 7 of the projected top 20 countries projected to be in Asia and the Pacific, much of the future impact of the world's Ecological Footprint will depend on actions taken by countries in the region (Dietz et al. 2007).

Driving these trends is the emergence of a new middle class, which will increase demand for energy, food, metals, and water. The global car fleet, for example, is expected to nearly double, to 1.7 billion by 2035 (IEA 2011). In the PRC, total meat consumption rose nearly 80% in the last 20 years (Earth Policy Institute 2012).

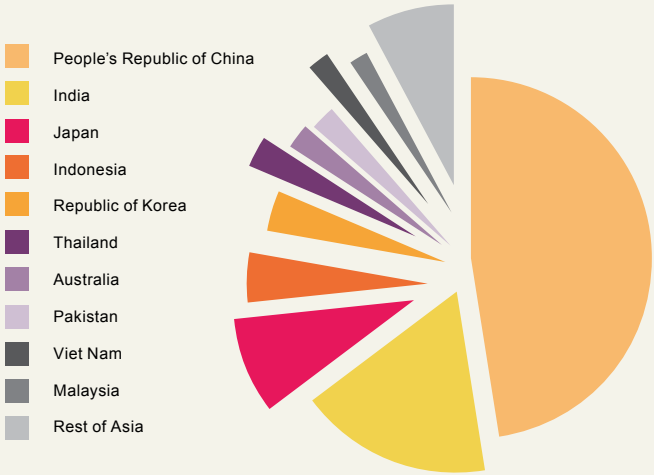


Figure 6: National Ecological Footprints as a Percentage of the Total Asia and the Pacific Footprint for 2008 (data Global Footprint network)

1961

FOR THE ASIA AND PACIFIC REGION, THE BIOCAPACITY PER PERSON IN 2008 HAD DECREASED TO ONLY TWO THIRDS OF THAT AVAILABLE IN 1961

A WIDENING BIOCAPACITY DEFICIT

To measure whether human demand for natural resources is balanced with what can be generated, humanity's Ecological Footprint is compared to biocapacity, or the amount and productivity of the natural capital such as cropland, grazing land, fishing grounds, and forests that is available within a country, a region or the planet. People draw on biocapacity directly for basic survival, and countries also use the biocapacity of other countries through their imports.

In Asia and the Pacific, the per capita Ecological Footprint (1.6 gha) far exceeds the per capita biocapacity (0.9 gha), leaving a biocapacity deficit of 0.8 gha per capita. Figure 7 shows the available biocapacity per country.

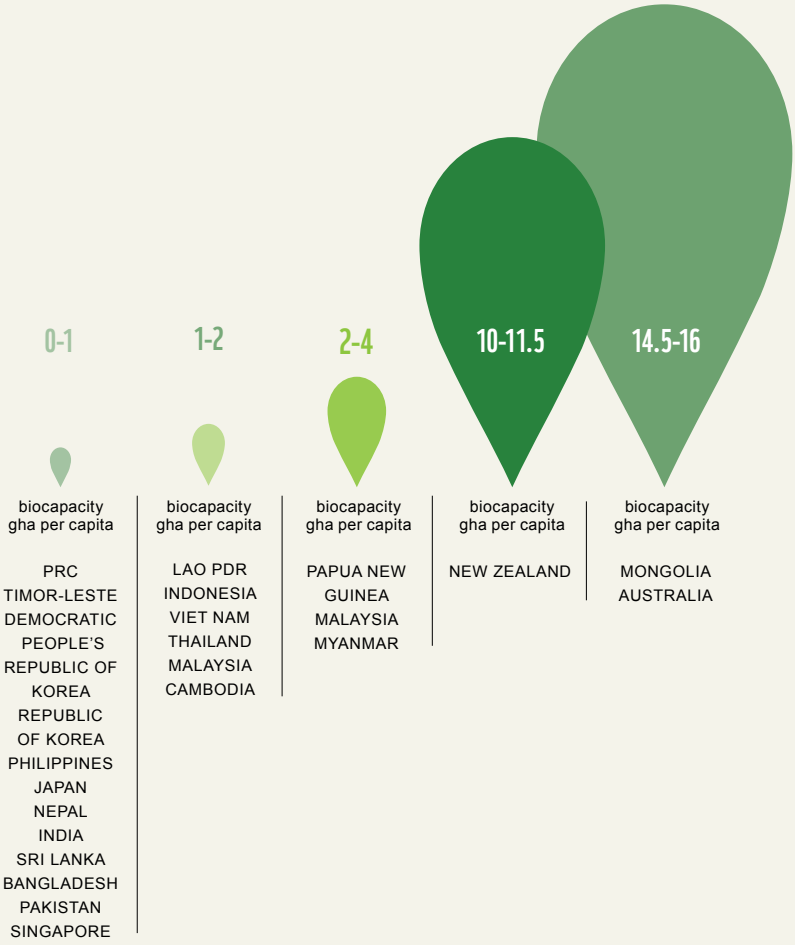


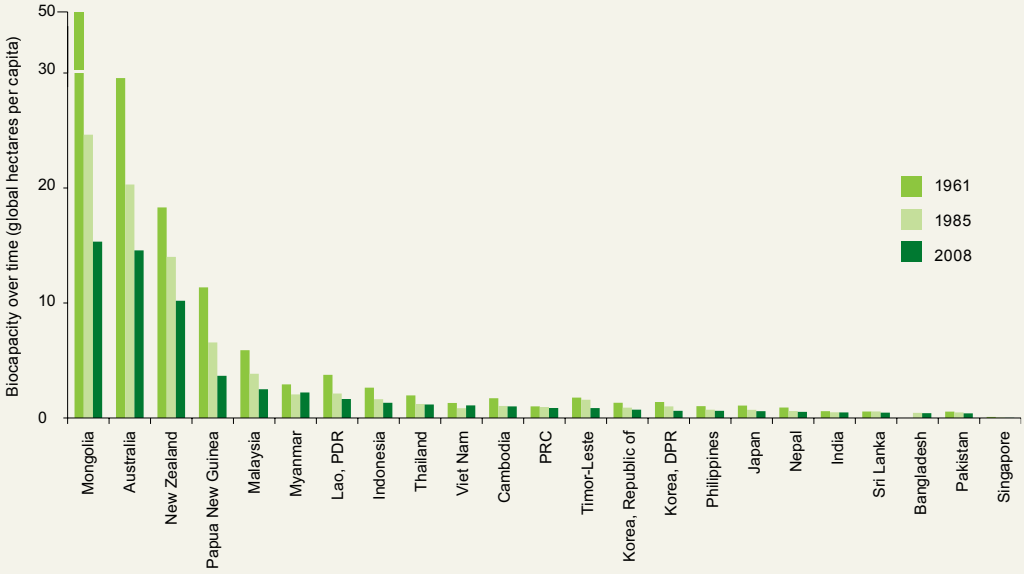
Figure 7: The Biocapacity Available to People of Asia and the Pacific in 2008 (data Global Footprint network)

Much of the seafood consumed in Hong Kong, China, is imported, and the 50 supplier countries are producing the seafood unsustainably

As populations grow more rapidly than biocapacity can increase, the average biocapacity available per person declines. For the Asia and Pacific region, the biocapacity per person in 2008 had decreased to only two thirds of that available in 1961, with every country in the region experiencing a decline (Figure 8). As a result, the gap between the Ecological Footprint and available biocapacity is widening in the region, mirroring the global trend. The effects of this increasing biocapacity deficit by can potentially lead to, including widespread habitat loss, overharvesting of renewable resources, and worsening climate change.

In addition, when importing countries out-source the production of food and fiber to other countries, they may also be burdening exporting countries with associated negative social or environmental impacts. In some cases, such impacts are regional or even global in scope. For example, much of the seafood consumed in Hong Kong, China, is imported, and the 50 supplier countries are producing the seafood unsustainably. The importation of live reef food fish and shark fin in particular are having significant impacts on regional and global marine ecosystems (WWF 2011e).

Figure 8: Trends in Biocapacity for Countries of Asia and the Pacific from 1961 to 2008 (data Global Footprint network)



LOOKING AHEAD: THE RISKS OF A BIOCAPACITY DEFICIT

80%

OF THE WORLD'S POPULATION USE MORE NATURAL RESOURCES THAN ARE GENERATED WITHIN THEIR OWN BORDERS

According to Global Footprint Network analysis (2010), more than 80% of the world's population lives in countries that use more natural resources than are generated renewably within their own borders. These countries, so called biocapacity debtors, have a biocapacity deficit that can only be met by continuing to deplete their natural resources beyond sustainable levels and/or by importing resources from other countries. Countries have the option of trading biocapacity in the form of commodities and the water and energy used to produce these commodities. As shown in Figure 9, the majority of countries in the Asia and Pacific region are biodiversity debtors, while only a few are biocapacity creditors (i.e., countries that have a greater biocapacity available than is currently being used).

The concept of biocapacity creditors and debtors does not mean that countries should only consume within their own borders and not engage in global trade. However, just as a trade deficit can be a liability, so can a biocapacity deficit. Since biocapacity is embodied in imported and exported commodity flows, countries with a high biocapacity deficit, such Singapore, the Republic of Korea, and Japan, may suffer more from rising commodity costs to sustain their consumption.

Throughout the 20th century, dramatic improvements in exploration, extraction, and cultivation techniques were able to keep supply ahead of ever-increasing global needs. This allowed prices of commodities to become progressively cheaper, even as the planet's population tripled and demand for various resources skyrocketed. Today however, the rapid emergence of a middle-class in developing countries is driving demands for commodities ever higher. At the same time, it is becoming more and

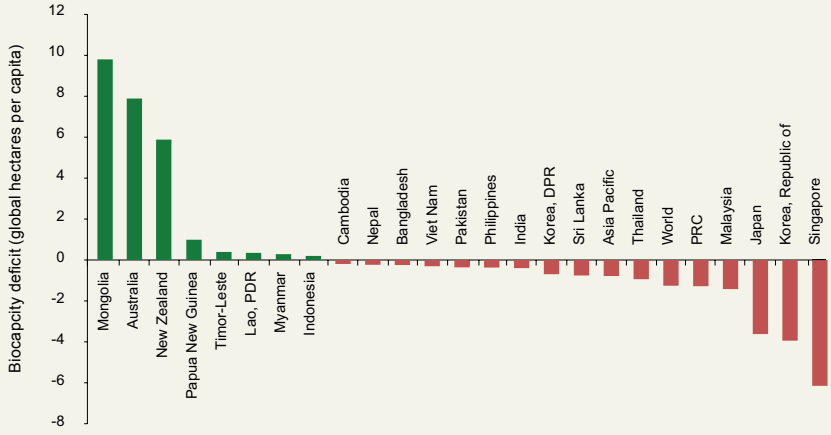


Figure 9: Biocapacity Debtors and Creditors in Asia and the Pacific for 2008 (data Global Footprint network)

more difficult to expand the supply of commodities -especially in the short term. Long-term marginal costs are increasing for many resources as the rate of depletion accelerates and new investments are made in more complex, less productive locations.

The result has been soaring commodity prices, from historic lows to new highs in little more than a decade. A recent report shows that during the past eight years alone, commodity prices have reversed the decline in prices during the previous century, rising to levels not seen since the early 1900s (McKinsey Global Institute 2011)[5]. In addition, there is great volatility because commodity prices are increasingly interlinked. If current trends hold, the economies of the world will face increasing challenges as global resource markets fluctuate in response to surging global demand and inelastic supplies. The world faces a win-lose proposition quite unlike the win-win we are accustomed to in global trade. With tight supplies of resources, countries that grow faster and richer can heavily impact global commodity prices, which in turn will put pressure on poorer countries and the relatively poor in every country.

With tight supplies of resources, countries that grow faster and richer can heavily impact global commodity prices, which in turn will put pressure on poorer countries and the relatively poor in every country

Countries with relatively fewer resources and lower resource efficiency, such as many in the Asia and Pacific region, will suffer the most from higher and more volatile prices for resources. This will heavily impact the most vulnerable, and will impede progress towards achieving the Millennium Development Goals[6]. Perhaps most significantly, there are growing concerns about both the adequacy and stability of food supply. Food supply is being affected by a number of factors, including rising material and labor costs, competing demands for freshwater, and loss of farmland for housing and industry (McKinsey Global Institute 2011).

A key challenge will be how to meet the needs of expanding and increasingly affluent populations, while reducing poverty and staying within environmental limits. Countries will need to adopt new models of growth that have much lighter impacts on the planet's resource base. Overexploitation of natural capital must be replaced with efficient and sustainable use. Over the long-term, efforts must go beyond improving the efficiency with which we use resources, to include systemic and structural changes, such as changing the mix of resource supply sources, building new green industries, cleaning up polluting sectors, and transforming consumption patterns.

5 McKinsey Global Institute's commodity price index is based on the arithmetic average of four commodity indexes: food, agricultural raw materials, metals, and energy.

6 The Millennium Development Goals (MDGs) are eight international development goals that all 193 United Nations member states and at least 23 international organizations agreed during the Millennium Summit in 2000, to achieve by the year 2015.

STATE OF KEY ECOSYSTEMS IN ASIA AND THE PACIFIC

Previous sections looked at how growing human demand for natural resources is leading to degradation of natural capital, decreasing the availability and quality of the ecosystem services these resources provide. This section provides an overview of the state of the ecosystems of Asia and the Pacific in light of the widening biocapacity deficit in the region.

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40%

OVER 40% OF THE CORAL REEFS AND MANGROVES OF THE REGION HAVE DISAPPEARED OVER THE LAST 40 YEARS

In the past two decades, the state of ecosystems in the Asia and Pacific region has been declining. Conversion of primary forests to agricultural land has resulted in a marked decrease in primary forests. Extensive coastal development and unsustainable exploitation of marine resources have resulted in the destruction of many major coastal habitats, including corals, mangroves, seagrasses, wetlands, and salt marshes. Over 40% of the coral reefs and mangroves of the region have disappeared over the last 40 years, resulting in declining fish stocks. Freshwater ecosystems have been converted for agricultural use and polluted with agricultural and urban waste, and their natural flow has been disrupted by water storage for agriculture, domestic use and hydropower. This has resulted in lower agricultural yields, declining freshwater fish stocks, and reduced access to clean drinking water.

One of the most widely used indicators being used to track the state of biodiversity around the world is the Living Planet Index (LPI), which can be regarded as an indicator of the health of the planet's ecosystems. The LPI reflects annual changes in the average size of over 9,000 populations of mammals, birds, fish, reptiles, and amphibians from 1970 to 2008. Within those 38 years, the global LPI fell by 28%. For the tropical and southern regions of the Indo–Pacific[7] the LPI shows a decline of 64 % in key populations of terrestrial and freshwater species over the same period (Figure 10).

The Living Planet Report 2012 (WWF 2012) has combined data from different regions to show trends in the LPI for terrestrial, marine and freshwater biomes and the world's bio–geographic areas. This makes it possible to interpret broad-scale trends in specific areas. For example, the LPI for tropical regions is worse than for temperate regions and the world as a whole. The reason for this rapid decline in tropical species populations can be linked both to historical patterns in land-use change and to a fairly recent increase in tropical deforestation. This contrasts sharply with the general slowing of deforestation in temperate regions (Millennium Ecosystem Assessment [MEA] 2005a). The LPI also indicates steep declines in the health of tropical marine and freshwater ecosystems.

7 The Indo–Pacific realm is only roughly equivalent to the region defined as "the Asia and Pacific region" in this report (specifically Indo–Malaya, Australasia, and Oceania, but not the northern People's Republic of China, the Korean Peninsula, or Japan).

Green turtles, Sipadan Island, Malaysia

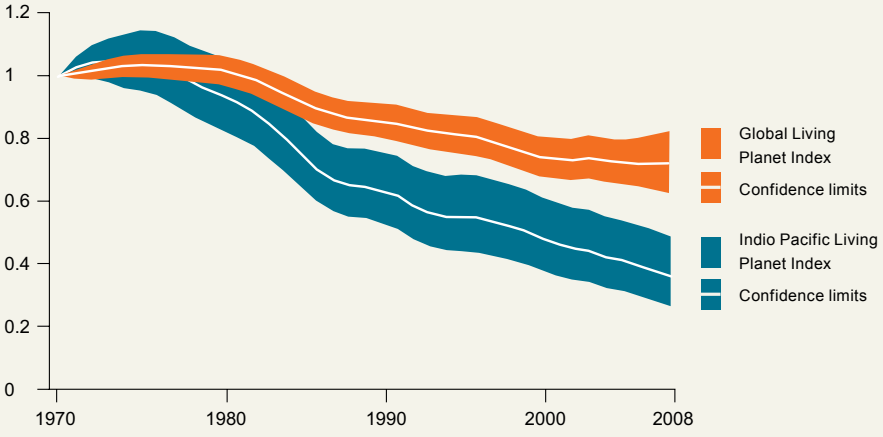


Figure 10: Global and Indo-Pacific Living Planet Index (data Zoological Society of London (ZSL)

FOREST ECOSYSTEMS

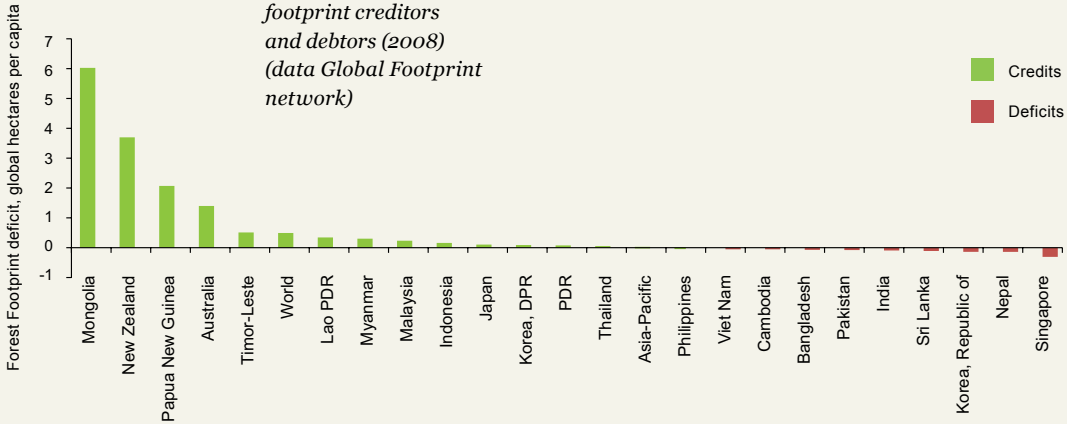
While 61% of the world's population lives in the Asia and the Pacific, the region has only 17% of global forests.

Forests are a source of many economic resources and vital ecosystems services. The value of primary forest products from countries of Asia and the Pacific was calculated at approximately $34 billion in 2008, although the region continues to be a net importer of such products (Food and Agriculture Organization of the United Nations [FAO] 2010).

Forests are also a major source of fuel, as they provide firewood for millions of mostly poor people. In Southeast Asia, firewood accounts for 72% of all harvested wood. In South Asia, that figure stands at 93% (Asia–Pacific Forestry Commission [APFC] 2010). As the demand for wood and other forest products increases so does the demand for ecosystem services, such as the availability of clean water, and flood prevention by forested watersheds.

While 61% of the world's population lives in the Asia and the Pacific, the region has only 17% of global forests. With 23% of the world's population, South Asia, for instance, has only 2% of global forests (APFC 2010). As a result, many South Asian countries have a forest biocapacity deficit, meaning that they consume more forest products per person than they are capable of producing from their own forest resources (Figure 11).

Figure 11: Forest footprint creditors and debtors (2008) (data Global Footprint network)



>20%

FROM 1990 TO 2010, THE AREA OF FOREST IN INDONESIA DECLINED BY 20% TO AROUND 24 MILLION HECTARES

With an average forest biocapacity of less than 1 gha of forest per person, the forests of Asia are under extreme pressure to perform a range of environmental and economic functions. In many parts of the region, forests are not being used sustainably and are being converted into agricultural land to produce commodities such as plantation timber, vegetable oils, and biofuel. Global and regional demand for timber and palm oil is responsible for much of the ongoing loss of forest ecosystems and biodiversity in Asia.

Deforestation rates remain especially high in Southeast Asia. From 1990 to 2010, the area of forest in Indonesia declined by 20% to around 24 million hectares (ha), and in Myanmar by 19% to around 7.5 million ha. In addition, the quality of much of the remaining forest is declining due to poor forestry practices, uncontrolled logging and fire.

In 2007, the Intergovernmental Panel on Climate Change (IPCC) confirmed that land use change, including deforestation, is the second largest global source of anthropogenic greenhouse gas emissions, accounting for 15-20 % of the global total (IPCC 2007). Southeast Asia is currently responsible for 12% of total greenhouse gas emissions, 75% of which can be attributed to land use change, including deforestation. According to estimates, emissions in Southeast Asia are also rising twice as fast as global emissions. (ADB 2009).

Despite ongoing losses of forested land, some encouraging signs for forests are emerging in Asia. As shown in Figure 11, the annual rate of loss of primary forests has declined and the growth of plantation forests is increasing, especially in the People's Republic of China (PRC). From 1990 to 2010, the area of forest in the PRC increased by 32% to around 50 million ha.

Globally, the importance of forests in providing ecosystems services has been more widely recognized in the past decade, with 57% of governments reporting that they have protected areas equal to or above 10% of their land area (Convention on Biological Diversity [CBD] 2010). Targets for further increasing the coverage of terrestrial protected areas to 17% were also agreed in 2010 by the 193 parties to the CBD, and this is expected to provide significant benefits for biodiversity conservation as well as a range of other ecosystem services.

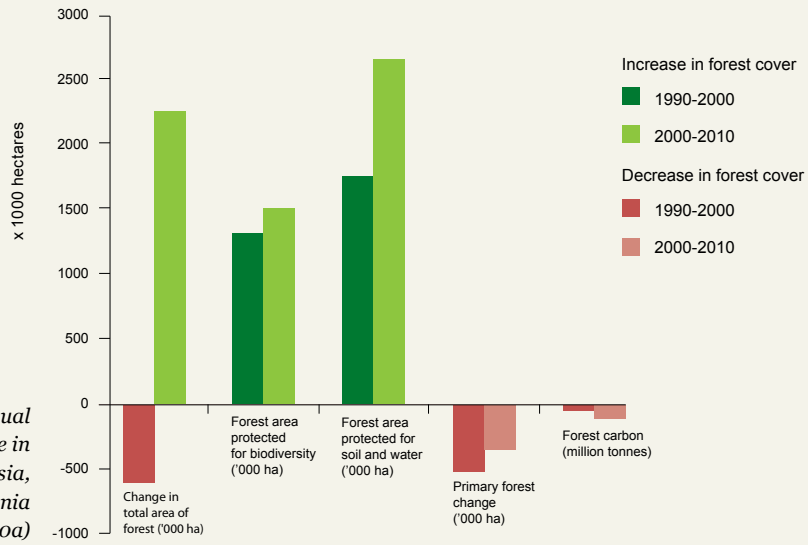


Figure 12: Annual Change in Forests of Asia, Excluding Oceania (FAO 2010a)

COASTAL AND MARINE ECOSYSTEMS

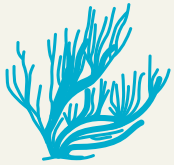
Coastal and marine ecosystems are among the world's most valuable natural habitats. They provide food and livelihoods for communities throughout Asia and the Pacific, as well as many other valuable ecosystem services upon which life depends. The vast areas of coastal and marine ecosystems of the Asia and Pacific region are associated with the North and South Pacific, and the Southern and Indian Oceans.

Fisheries and aquaculture in Asia and the Pacific play an important role in providing food security and vital income. The ocean waters of the Pacific in particular, are among the most productive and pollution-free on Earth. They are home to the world's largest stocks of tuna and other species that underpin much of the region's economy (Secretariat of the Pacific Regional Environment Programme [SPREP] 2011). The Association of Southeast Asian Nations (ASEAN) region has an estimated 12 million registered fishers, many of whom depend on part-time fishing for their basic livelihoods.

Across six Coral Triangle countries, at least 6 million people are directly employed in primary capture fisheries or secondary production. In 2007 the capture fisheries sector in Indonesia provided employment for 2.2 million people (Asia–Pacific Fishery Commission 2010). In the Philippines, the fisheries sector provided direct and

75%

IN EAST ASIA ALMOST 75% OF THE POPULATION OF ALMOST 2 BILLION LIVES IN COASTAL AREAS



indirect employment to over one million people, or about 12% of the agriculture, fisheries and forestry sector workforce (Funge-Smith, Staples, and Sugiyama 2004).

Unfortunately, rapid economic development and population growth are increasing pressure on the region's coastal and marine ecosystems. In East Asia, almost 75% of the population of almost 2 billion lives in coastal areas. Coastal development, unsustainable use of coastal and marine resources, and environmental degradation have resulted in a direct loss of many major coastal habitats, including mangroves, seagrasses, wetlands, and salt marshes. As a result of these trends, much of the natural capital that stabilizes and protects coastal areas and maintains biodiversity, fish nursery habitats, and water quality has been lost. Threats from climate change and natural hazards are intensifying these concerns (Chou 2010).

The global demand for fish is one of the main threats to the region's marine resources. Overfishing and destructive fishing practices, such as cyanide and dynamite fishing, not only deplete stocks, but can also decimate marine biodiversity such as marine turtles and the marine and coastal habitats that are necessary for healthy marine ecosystems. Approximately 50% of coral reefs in Southeast Asia are at risk from such practices. In the Philippines, this figure is as high as 70%. These unsustainable practices are causing large declines in fish stocks, in some cases as much as 40% in 5 years, especially in the Gulf of Thailand and the east coast of Malaysia (Funge-Smith, Staples, and Sugiyama 2004). Global fisheries production has been declining since it peaked in the late 1980s (MEA 2005b). Most major wild-caught fisheries resources have been depleted and the increased production of fish from aquaculture is adding to pressure on coastal habitats, especially mangroves and coral reefs. Shrimp aquaculture in particular has been responsible for much of the conversion of coastal ecosystems in the Asia and Pacific region, and the economic and environmental sustainability of this development is in doubt (e.g., Mulekom et al. 2006).

In 2010, the new Strategic Plan for Biodiversity 2011–2020 was endorsed at the 10th Conference of the Parties to the Convention on Biological Diversity (CBD) in Nagoya, Japan. It consists of 20 new biodiversity targets for 2020, termed the "Aichi Biodiversity Targets. One of the targets is for at least 10% of coastal and marine areas to be conserved through well-managed and well-connected systems of protected areas by 2020 and integrated into the wider seascapes.

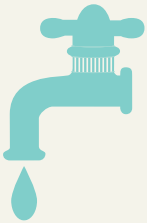
FRESHWATER ECOSYSTEMS

Freshwater ecosystems vary enormously across the Asia and Pacific region, from major tropical river basins with their headwaters in the Himalayas, to the inland wetlands of Australia's Lake Eyre Basin. Wetland ecosystems, including rivers, lakes, marshes, rice fields, and coastal areas, provide many services that contribute to human well-being and poverty reduction.

While the Asia and Pacific region has the world's largest share of renewable freshwater resources, it has the lowest availability of water per capita. The region accounts for 38% of the world's water resources, while supporting about 60% of the world's population. In South Asia, 25% of the world's population depends on about 4.5% of the world's available water resources. Therefore, in many areas around the region there is intense competition for available water supplies, including for the many valuable ecosystem services provided by water (e.g., habitats for native species, recreational and commercial fisheries, maintenance of deltas, and natural floodplain fertility).

25%

IN SOUTH ASIA, 25% OF THE WORLD'S POPULATION DEPENDS ON ABOUT 4.5% OF THE WORLD'S AVAILABLE WATER RESOURCES



On average, about 11% of the region's total renewable resources are withdrawn annually, one of the highest rates in the world (Leadership Group on Water Security in Asia 2009). Seasonal shortfalls in the availability of water constitute another growing crisis in many parts of the region. While effective water sharing arrangements will become increasingly important, in many places, such as in countries in South Asia and some states, as in India, sharing water has long been a sensitive issue.

Water shortages are having severe ripple effects, given that roughly 70 percent of all water is consumed by agriculture and 12 percent by energy production. In many places, more intense agricultural activity may help meet food demands in the short term, but intensive farming techniques may also drive up regional demand for water, further impacting water security in some places.

In addition, the amount of water needed to produce energy is increasing along with energy demand. For instance, in the PRC, declining water availability has emerged as a major problem for the energy sector, which uses one fifth of the PRC's water consumption (Ivanova 2011). Also, large-scale dams on Asia's major river basins, such as the Yangtze in the PRC and the Mekong River Basin, alter natural water flows, trap nutrients and sediments, and block the passage of many freshwater and marine species. The need to balance economic and environmental flows has been gaining increasing recognition.

70%

70 PERCENT OF ALL WATER IS CONSUMED BY AGRICULTURE AND 12 PERCENT BY ENERGY PRODUCTION

In some areas, climate change will further aggravate water shortages by causing longer and more extreme droughts, further undermining food security. In other areas, climate change will lead to extreme rainfall events, thereby increasing the incidence of severe flooding. In addition, the long-term effects of glacier melt under climate change include reduced river flows that will reduce supply to downstream countries and dry up some perennial sources of potable water and irrigation.

Additionally, water quality in many countries of the region is in decline, further worsening supply problems. The Challenges to International Waters report (UNEP 2006) states that water pollution and freshwater shortages are two of five serious global problems that are expected to increase in severity by 2020. Root causes for pollution are agricultural development, population growth, urbanization and industrialization, and market and policy failures. Pollution of freshwater leads to the loss of aquatic ecosystems and food, particularly fish; to disease, such as a high incidence of cancer, blue baby syndrome, blindness, and maternal and infant mortality; and to negative economic impacts, such as high treatment costs to turn polluted water into drinking water (Lall 2012).

REGIONAL INITIATIVES TO SUSTAIN NATURAL CAPITAL

As Asia and the Pacific continues its rapid economic growth, a key challenge for the region is to find the green economy pathways that will support further improvements in human development, without dramatically increasing its Ecological Footprint. To do so, it will be important for nations to maintain natural capital in order to safeguard biocapacity and the continued flow of ecosystem services that underpin human welfare.

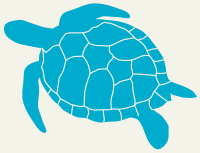
© Jun Lao

Maintaining natural capital through better governance, natural resource management and proper investment can help ensure that natural resources in the Asia and Pacific region are used sustainably, and that the ecosystem services essential to billions of people are not compromised.

Often referred to as the "Amazon of the Seas", the Coral Triangle is the planet's richest center of marine life and coral reef diversity, covering a vast area of ocean that spans Indonesia, Malaysia, the Philippines, Papua New Guinea, Solomon Islands, and Timor-Leste

Maintaining natural capital will also allow a greater share of the economic benefit of natural resources to remain within the regional economy, helping to alleviate poverty at the local, national, and regional levels (Turner et al. 2012). Furthermore, investment and equitable natural resource governance will help build the economic, social and ecological resilience that will be needed to help the region withstand the impacts of climate change.

ADB, WWF, and other partners are supporting Asia and the Pacific countries as they cooperate on a regional level to manage their natural resources and invest in natural capital. This section showcases major initiatives in four regions that demonstrate how cooperative action to improve the management of natural resources and ecosystems can make a difference.



THE HEART OF BORNEO

Straddling parts of Brunei Darussalam, Indonesia, and Malaysia, the Heart of Borneo contains the largest remaining rainforest in Asia, with a rich array of diverse natural habitats and huge carbon stocks. With one conservation vision, the three countries agreed under the joint Heart of Borneo Initiative (HoB), to cooperate to promote people's welfare, and to improve the management of forest resources and the conservation of a network of protected areas, productive forests and other sustainable land-uses. Through regional, national and sub-national actions plans and partnerships, various approaches are being developed and implemented, including facilitation of multi-stakeholder dialogues, expansion of protected areas, mobilization of sustainable financing and introduction of sustainable business practices.

THE CORAL TRIANGLE

Often referred to as the "Amazon of the Seas", the Coral Triangle is the planet's richest center of marine life and coral reef diversity, covering a vast area of ocean that spans Indonesia, Malaysia, the Philippines, Papua New Guinea, Solomon Islands, and Timor-Leste. United in their

commitment to address threats to the region associated with overfishing, pollution, and climate change, the six Coral Triangle countries established the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF), which has produced important collaborative action plans to sustainably manage the region for future generations. Key areas of focus include managing priority seascapes and networks of marine protected areas, applying ecosystem based approaches to fisheries management, addressing climate change, and protecting threatened species.

THE GREATER MEKONG SUBREGION

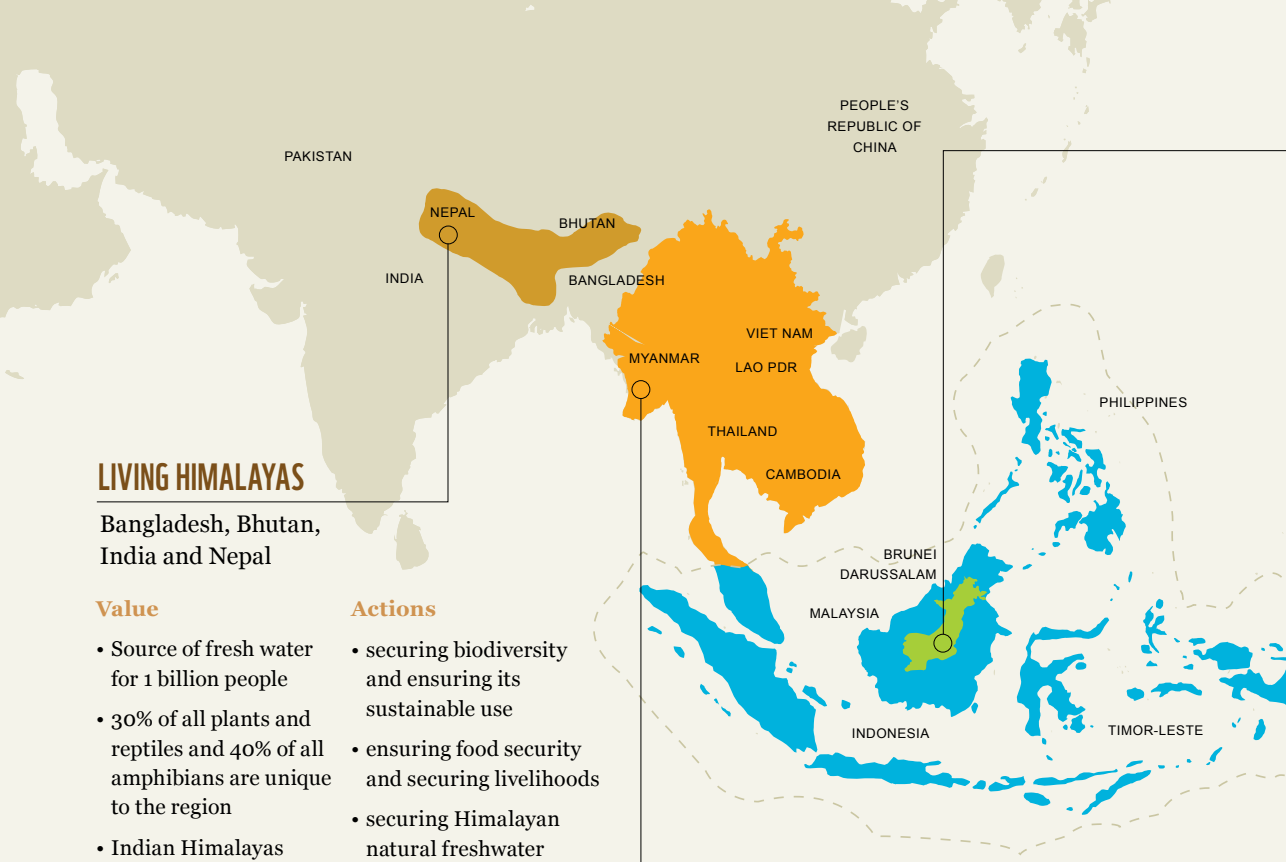
GMS

THE GREATER MEKONG SUBREGION IS ONE OF THE MOST BIOLOGICALLY DIVERSE PLACES ON THE PLANET AND IS HOME TO NUMEROUS ENDANGERED SPECIES

The Greater Mekong Subregion (GMS) is one of the most biologically diverse places on the planet and is home to numerous endangered species. The Mekong River Basin is also the richest river basin in the world in terms of fish stocks, and its productivity is directly linked to the livelihoods of people in the region. Recognizing the enormous importance of the region's natural capital, the six countries of the GMS – Cambodia, the People's Republic of China (PRC), Lao PDR, Myanmar, Thailand and Viet Nam agreed to enter into a regional collaboration on the environment and established the Core Environment Program–Biodiversity Conservation Corridors Initiative (CEP-BCI). With the goal of a poverty-free and ecologically rich GMS, the countries are undertaking a range of activities to improve natural resource management, biodiversity conservation and climate resilience. Numerous other programs are also being implemented with support from various partners, contributing to a comprehensive approach to sustaining natural capital in the region.

THE LIVING HIMALAYAS

The "Living Himalayas", which is a part of the biologically rich Eastern Himalayan mountain range, extends across India, Nepal, Bangladesh and Bhutan. It is the source of fresh water for one billion people and feeds seven major rivers, including the Ganges and Brahmaputra. While the natural resources of the region are vital for the livelihoods of local people, mountain ecosystems are under severe threat from increasing human populations and haphazard infrastructure development. Climate change is accelerating the melting of glaciers, which will have major impacts on fresh water and energy security. To address these issues, the four countries recently adopted a "Framework of Cooperation" to build resilience to climate change in the Eastern Himalayas. The framework outlines key areas of cooperation, covering issues such as conservation of biodiversity, energy, food security and livelihoods, and natural freshwater systems.



LIVING HIMALAYAS

Bangladesh, Bhutan, India and Nepal

Value

- Source of fresh water for 1 billion people
- 30% of all plants and reptiles and 40% of all amphibians are unique to the region
- Indian Himalayas hold amount of carbon roughly equal to total annual Asian carbon emissions from fossil fuels

Actions

- securing biodiversity and ensuring its sustainable use
- ensuring food security and securing livelihoods
- securing Himalayan natural freshwater systems
- ensuring energy security and supporting alternate technologies

1 BILLION

SOURCE OF FRESH WATER FOR 1 BILLION PEOPLE

60 MILLION

LIVELIHOODS OF 60 MILLION PEOPLE DEPEND ON THE MEKONG RIVER

GREATER MEKONG SUBREGION

Cambodia, the PRC, Lao PDR, Myanmar, Thailand, and Viet Nam

Value

- 1,231 new species were discovered between 1997 and 2008
- The largest inland fishery in the world ($1.4-3.9 billion USD/ year)
- Livelihoods of 60 million people depend on the Mekong River
- About 100 million hectares of forests capturing globally significant carbon stocks

Actions

- Restoring biodiversity conservation corridors
- Mainstreaming environment in planning through tools such as Strategic Environmental Assessments and Environmental Performance Assessments
- Establishing Sustainable financing incentives such as REDD+ and PES
- Promoting Sustainable hydropower.

HEART OF BORNEO

Brunei Darussalam, Indonesia and Malaysia

Value

- The largest contiguous forest area remaining in Southeast Asia (22 million ha)
- 6% of the world's total biodiversity
- Average of 3 new species discovered per month
- Vast range of ecosystem services including climate regulation through carbon storage and sequestration (the HoB landscape stores an estimated 3.2 billion tonnes of carbon)
- $1.2 billion tourism industry in Sabah with more than 2 million visitors per year

Actions

HoB Strategic Plan of Action:

- Transboundary Management
- Protected Areas Management
- Sustainable Natural Resource Management
- Ecotourism Development
- Capacity Building

22

22 MILLION HA OF RAINFOREST – THE LARGEST CONTIGUOUS FOREST AREA REMAINING IN SOUTHEAST ASIA

CORAL TRIANGLE

Indonesia, Malaysia, Papua New Guinea, the Philippines, Solomon Islands, and Timor-Leste

Value

- 120 million people depend directly on local marine and coastal resources
- Total value of international fisheries exports from CT countries $3.8 billion
- Home to 3,000 species of fish and 37% of all coral reef fish species
- Home to six of the world's seven species of marine turtles and a majority of the planet's mangroves (and 51 of the 70 world's mangrove species)

Actions

CTI-CFF Regional Action Plan:

- Designation and management of priority seascapes
- Ecosystem Approach to Management of Fisheries (EAFM)
- Marine Protected Areas (MPAs)
- Climate change adaptation measures
- Improvement of threatened species status

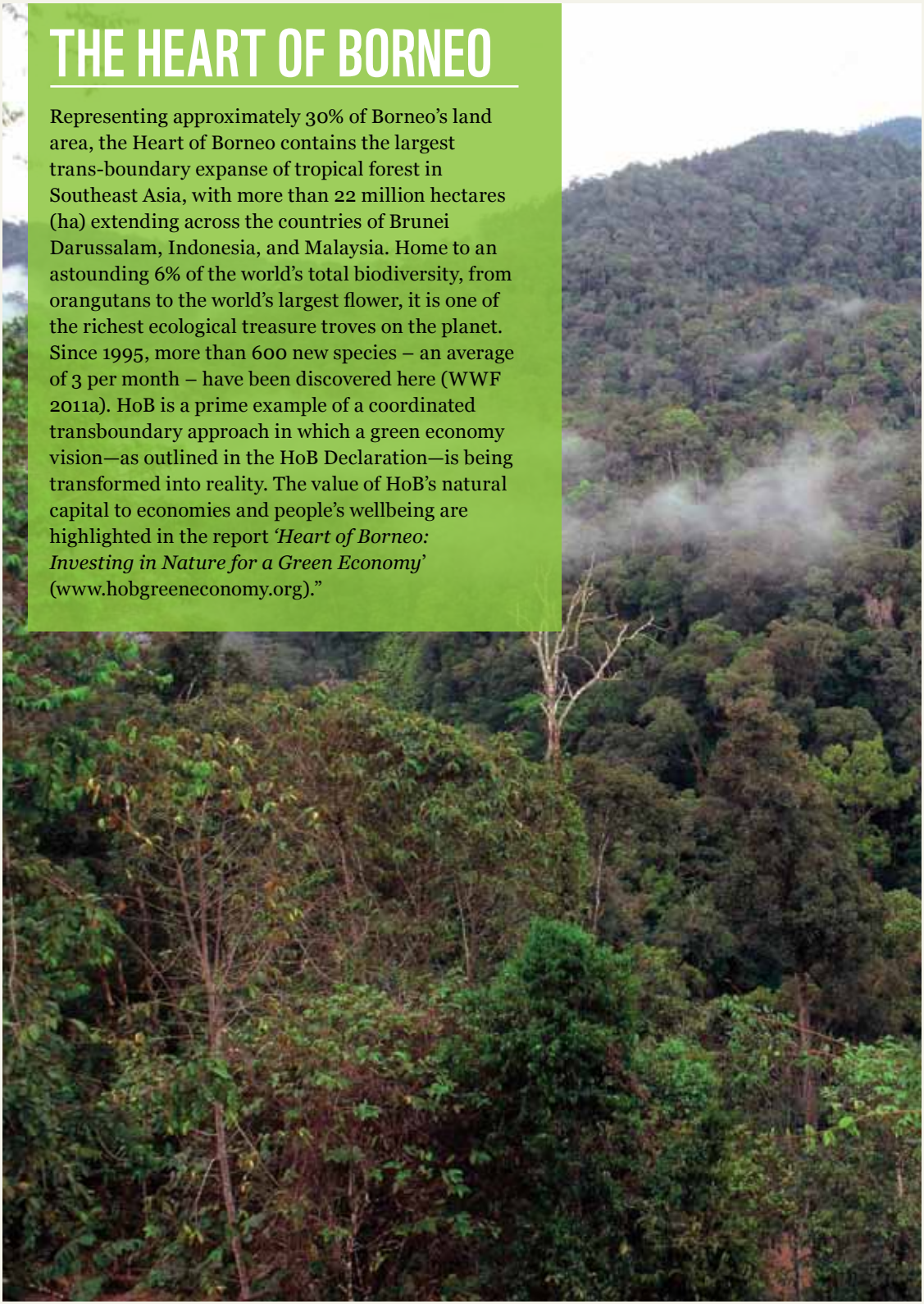
$3.8

$3.8 BILLION TOTAL VALUE OF INTERNATIONAL FISHERIES EXPORTS FROM CT COUNTRIES

The boundaries, colors, denominations, and any other information shown on the map do not imply any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries, colors, denominations, or information

THE HEART OF BORNEO

Representing approximately 30% of Borneo's land area, the Heart of Borneo contains the largest trans-boundary expanse of tropical forest in Southeast Asia, with more than 22 million hectares (ha) extending across the countries of Brunei Darussalam, Indonesia, and Malaysia. Home to an astounding 6% of the world's total biodiversity, from orangutans to the world's largest flower, it is one of the richest ecological treasure troves on the planet. Since 1995, more than 600 new species – an average of 3 per month – have been discovered here (WWF 2011a). HoB is a prime example of a coordinated transboundary approach in which a green economy vision—as outlined in the HoB Declaration—is being transformed into reality. The value of HoB's natural capital to economies and people's wellbeing are highlighted in the report *'Heart of Borneo: Investing in Nature for a Green Economy'* (www.hobgreeneconomy.org)."



ECONOMIC VALUE OF NATURAL CAPITAL

The natural capital of the Heart of Borneo is essential to meeting the overlapping goals of economic growth, poverty alleviation and energy and food security across the region (WWF and PricewaterhouseCoopers [PwC] 2011). The region's healthy forested ecosystems provide a range of valuable services for local and national economies and for the island's people[8].

For instance, the mountainous forests of the region help ensure clean water supplies for Borneo's inhabitants. Of the 20 major rivers in Borneo, 14 emanate from mountainous forestland and cover nearly 70% of the island. The rivers are crucial for industry, agriculture and energy generation. They also provide clean drinking water and are an important means of transport in Borneo. When the forests are lost or degraded, there are higher risks of unpredictable floods and droughts, threats to shipping, and damage to industrial, agricultural and domestic water supplies. The forests and peatlands of Borneo are also effective carbon stores. However, most of this carbon is being released by deforestation and land degradation (Paoli et al. 2010).

70%

OF THE 20 MAJOR RIVERS IN BORNEO, 14 EMANATE FROM MOUNTAINOUS FORESTLAND AND COVER NEARLY 70% OF THE ISLAND

THREATS TO NATURAL CAPITAL

As shown in Figure 13, Borneo lost an average of 850,000 ha of forest every year between 1985 and 2005 (WWF 2005). If this trend continues, forest cover will drop to less than a third by 2020. Deforestation in Indonesia and Malaysia currently accounts for more than 80% of the countries' total carbon emissions, or more than 2.5 gigatons of carbon per year (USAID 2008). This equals almost four times the annual emissions from the global aviation industry. Much of this deforestation, and the resulting emissions, are due to conversion of forestland to palm oil plantations, along with forestry and mining activities.

Palm oil plantations

One of the biggest drivers of deforestation in Southeast Asia is the growth of oil palm plantations in response to global demand for palm oil, the most important tropical vegetable oil in the global oils and fats industry. In 2008, palm oil production in Borneo stood at 16.5 million tons, more than a third of Indonesia's and Malaysia's combined production. Together the two countries produce more than 85% of the global palm oil supply. Since 2000, the total planted area in Borneo has increased by around 5% per year in Malaysia (MPOB 2009), and by 9% per year in Indonesia (Indonesian Commercial Newsletter 2009), a total of 3.6 million ha in 2008 in Borneo alone (WWF and PwC 2011).

8 An assessment of the economic value of the natural capital of the Heart of Borneo is underway and will provide a framework for developing green economy initiatives.

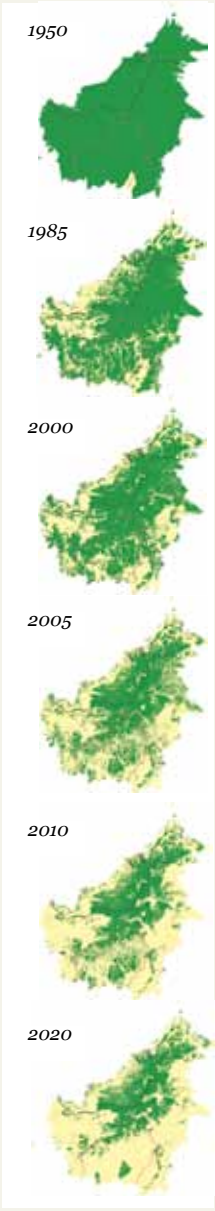


Figure 13: Past and projected forest loss on Borneo.

An analysis of land-cover data compiled by the United Nations Food and Agriculture Organization (UN FAO) found that during the period of 1990–2005, at least 55% of palm oil expansion in Malaysia and 56% of that in Indonesia occurred at the expense of forests (Koh and Wilcove 2008). Due mainly to the high levels of carbon released by the conversion of tropical forests and peatlands to palm oil plantations, the growth of this industry is also a major component of Malaysia and Indonesia's carbon footprint (Dewi et al. 2009).

Forestry and mining

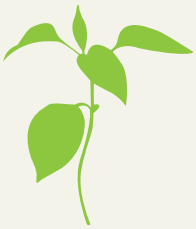
Forestry is an important source of revenue for Indonesia and Malaysia. In 2008, export revenues totaled $6.7 billion and $6.8 billion, respectively. Forestry provides income for rural communities, employing more than 300,000 in Malaysia and 500,000 in Indonesia. Plans for economic development also prioritize the exploitation of energy resources -especially coal- to help meet growing domestic and export market demands. Kalimantan holds 53% of Indonesia's 4,300 million tons of recoverable coal reserves, and Sabah and Sarawak hold 99% of Malaysia's 1,724 million tons of coal deposits. Borneo also holds rich metal and mineral resources, including tin, copper, gold, silver, coal, diamonds, and different types of sand and stone. Together, the forestry and mining sectors are one of the main contributors to forest loss in Borneo.

HEART OF BORNEO DECLARATION AND STRATEGIC PLAN OF ACTION

In February 2007, the governments of Brunei Darussalam, Indonesia and Malaysia signed the Heart of Borneo Declaration (WWF 2007). This agreement committed the three governments to one conservation vision to ensure the effective management of forest resources and the conservation of a network of protected areas, productive forests, and other sustainable land uses. The main objectives are to improve the welfare of the island's population and protect the island's forests and biodiversity. This represents a bold step towards large-scale nature conservation and the sustainable use of natural resources in this region. The declaration has led to a regional strategic plan of action and to national plans that guide actions over multiple sectors in each of the three countries. The Heart of Borneo also benefits from having governance bodies that represent a range of sectors and that are responsible for driving environmental conservation and socioeconomic development in each of the three countries.

The declaration and the action plans, together with the governance groups, have received international acclaim for designing effective green development strategies that promise to deliver lasting and balanced environmental, economic and social benefits. For example, both the

Forestry provides income for rural communities, employing more than 300,000 in Malaysia and 500,000 in Indonesia



Central and East Kalimantan Provinces of Indonesia have developed low carbon growth and prosperity plans, while the State of Sabah in Malaysia has recently committed to a green economy framework and a state-wide plan for Reducing Emissions from Deforestation and Forest Degradation (REDD+). Brunei Darussalam is also working on diversifying its economy.

In addition, policies and practices have been improving, paving the way for innovative initiatives such as payment for ecosystem services (PES) in Kalimantan, public–private conservation programs in Brunei Darussalam, and the provision of incentives to jump-start investment in renewable energy in Malaysia. Further examples of innovative practices are discussed below.

Establishing multi-stakeholder dialogues

The three governments have collectively and individually developed forums and dialogues with key development partners, including multilateral organizations such as ADB, the United Nations Development Programme (UNDP), and the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UNREDD), as well as bilateral agencies from Norway, Sweden, Australia, the European Commission, Europe, Asia, North America, and others. WWF has supported these dialogues in order to make sure that technical, financial and policy support are provided for the agreed priorities of the Heart of Borneo programs.

The international conference, "Heart of Borneo and Green Economy—Engaging Business for Environment", hosted by the State Government of Sabah, Malaysia, in November 2011, was one such example. It successfully showcased efforts in the Heart of Borneo to develop strong government and business leadership in order to create a more sustainable future for the Asia and Pacific region.

Mobilizing "green" incentives and financing arrangements

In order to ensure the sustainability of the actions promoted by the Initiative, a range of financial incentives and benefit-sharing mechanisms are being developed. For example, approaches and financial mechanisms for Reducing Emissions from Deforestation and Forest Degradation and other actions to conserve and enhance carbon stocks (REDD+) are being piloted. Under REDD+, forest managers in developing countries are compensated when the forests provide global benefits by reducing concentrations of carbon dioxide in the

atmosphere. This provides additional incentives for the protection and management of forests. In the Heart of Borneo, with its large and important forest resources and carbon stocks, REDD+ financing offers an immediate investment opportunity that addresses forest conservation as well as climate change mitigation (ADB 2010).

Currently, there are several initiatives underway that support REDD+ investments targeting the Heart of Borneo, including new programs funded by the Global Environment Facility (GEF), ADB, the United Nations Development Programme (UNDP), the Norway–Indonesia REDD+ Partnership, the Kalimantan Green Corridor project with support from several United Nations agencies, and the Forest Investment Program in Indonesia.

$28.5 MILLION

INVESTMENT TO HELP PROTECT TROPICAL FORESTS IN THREE DISTRICTS

In September 2011, Indonesia and the United States signed an historic debt-for-nature swap agreement that will result in a new $28.5 million investment to help protect tropical forests, cut greenhouse gas emissions caused by deforestation, and support biodiversity conservation in three districts of Kalimantan in Indonesia. This debt-for-nature-swap—the first of its kind with a REDD+ focus—allows Indonesia to reduce some of its debt in exchange for its support for investment-financed activities aimed at conserving its tropical forests and biodiversity (WWF 2011b). The agreement will also bolster economic growth and benefit local communities while investing in various measures that reduce forest destruction, such as better land-use planning, improved productivity of degraded lands, and more effective management of protected areas.

Another approach that looks promising is the use of watershed service payments to maintain the forests and watersheds in the Heart of Borneo. Forested watersheds provide numerous benefits, such as water purification, flood control and fresh drinking water. Under the scheme, payments are made to owners or managers of forested lands that provide water-related ecosystem services -including traditional owners and indigenous peoples- to encourage them to better manage and conserve those forests. Often, beneficiaries downstream make payments to the upstream forest owners or managers (Hanson, Talberth, and Yonavjak 2011).

An ongoing WWF/CARE/International Institute for Environment and Development (IIED) initiative in the Kapuas Hulu district (West Kalimantan, Indonesia), uses such an incentive scheme to improve watershed management, as it assists villages to better plan and carry out development programs. Potential buyers of the watershed-related services include the Public Water Service, other districts along the Kapuas River, the provincial government, and industry, while the sellers

of the watershed management service are communities living in and around Betung Kerihun National Park.

Similar approaches are being developed in Sabah, Malaysia, including REDD+ programs to improve the management of forest reserves and corridors, and to reduce emissions that result from activities such as deforestation and land use. Additionally, the 10th Malaysian Plan, an economic blueprint for Malaysia's national budget to 2015, acknowledges that proper valuation of Malaysia's environmental and ecological resources is key to making sure these resources are used sustainably (Prime Minister's Department of Malaysia 2010). One way the government is doing this is by focusing on the link between the preservation of ecosystems and business operations. Translating the national growth priorities into initiatives and activities at the local level in Sarawak and Sabah is part of the blueprint for sustainable growth in both states.

4 MILLION

THERE ARE AN ESTIMATED 4 MILLION HA OF PROTECTED AREAS WITHIN THE HEART OF BORNEO, WITH MORE THAN 1 MILLION MORE HECTARES PLANNED

Expanding protected areas to include areas which provide for multiple ecosystem services

Well-managed protected areas are at the core of the Heart of Borneo program. There are an estimated 4 million ha of protected areas within the Heart of Borneo, with more than 1 million more ha planned. The two largest national parks on the island of Borneo are found in the Heart of Borneo, namely Kayan Mentarang in East Kalimantan Province and Betung Kerihun in West Kalimantan Province. The protected areas that run across the three countries are linked through forest corridors and conservation landscapes. The network of functioning nature reserves, parks, and responsibly managed logging concessions vastly improve chances that the Heart of Borneo can meet its ecological and economic needs. The protected areas provide ecosystem services for tourism, sustainable timber, non-timber forest products, drinking water, and carbon storage. Through the Heart of Borneo Trilateral Strategic Plan actions, the governments of Brunei Darussalam, Indonesia, and Malaysia have agreed to identify, assess and establish trans-boundary conservation zones in order to strengthen the management of the protected areas for both natural and cultural heritage values, water catchments capacity, and preservation of biodiversity.

The management of protected areas and conservation landscapes within the Heart of Borneo are, however, facing numerous challenges. Due to their often-remote location, many of the protected areas do not have fully mapped boundaries, or management plans approved by all

the stakeholders. This is also true for the protected areas that adjoin the international boundaries. This lack of clarity can lead to competing land use claims or disputes over access rights. Another challenge is lack of funding, which severely limits management, training, monitoring and enforcement capacities in protected areas. These deficiencies weaken the viability of protected areas and pose real challenges to ensuring that the conservation landscapes within the Heart of Borneo provide the many ecological, economic, and social benefits that are expected of them.

Encouraging sustainable business practices

8%

8% OF THE AREA THAT WAS ALLOCATED AS CONCESSIONS IN THE HEART OF BORNEO PRODUCED CERTIFIED SUSTAINABLE TIMBER OR PALM OIL IN 2011

A number of green development activities can help attract domestic and foreign investment from both the public and private sector and improve the quality of the environment and the well-being and prosperity of local inhabitants. These include generating renewable energy, bio-prospecting, ecotourism, and trade in forest carbon and other ecosystem service markets.

One practice that is gaining traction in the region is the establishment of markets for sustainable timber and palm oil. Associations have been established to address the need for certification and verification of the supply chain for these products, such as the Forest Stewardship Council and the Roundtable on Sustainable Palm Oil (RSPO).

Formed in 2004, the RSPO is an association of palm oil producers and traders, consumer goods manufacturers, retailers, banks and investors, and environmental or conservation organizations, that focuses on developing and implementing global standards for sustainable palm oil. Plantations that produce sustainable palm oil grow palm trees on degraded land instead of in areas with primary forest. An initiative called The Green Business Network is providing a platform to rally the private sector to adopt more sustainable business practices. A useful tool, the Palm Oil Buyers Scorecard (WWF 2011c) has been developed by WWF to measure the performance of a number of major retailers and consumer goods manufacturers to determine if they are acting responsibly.

All of these initiatives are encouraging consumers and companies to buy and source sustainable palm oil in order to increase the size of the market and reduce conversion of primary forest to palm oil plantations. Already, thanks to private sector efforts alone, 8% of the area that was allocated as concessions in the Heart of Borneo produced certified sustainable timber or palm oil in 2011 (WWF 2011d[10]).

10. 40% of the area of Heart of Borneo consists of concessions, which are available for the private sector for forestry, palm oil, and mining projects.

Mangroves split level. Banggi, Kudat, Malaysia

THE CORAL TRIANGLE

The Coral Triangle is the global center of marine biodiversity, holding the highest diversity of corals, fish, crustaceans, mollusks and marine plant species in the world. The region offers a complex mix of diverse habitats, including more mangroves than anywhere on the planet and vast coral reef ecosystems. These habitats support a staggering array of marine life.

The region is home to 76% of all known coral species and 3,000 species of fish, including commercially valuable yellowfin, skipjack and bigeye tuna that migrate and spawn in these tropical waters. Twenty-seven species of marine mammals can be found there, including dolphin, whale, and the endangered dugong. The coasts also provide nesting and foraging grounds for six of the world's seven species of marine turtles.

ECONOMIC VALUE OF NATURAL CAPITAL

27

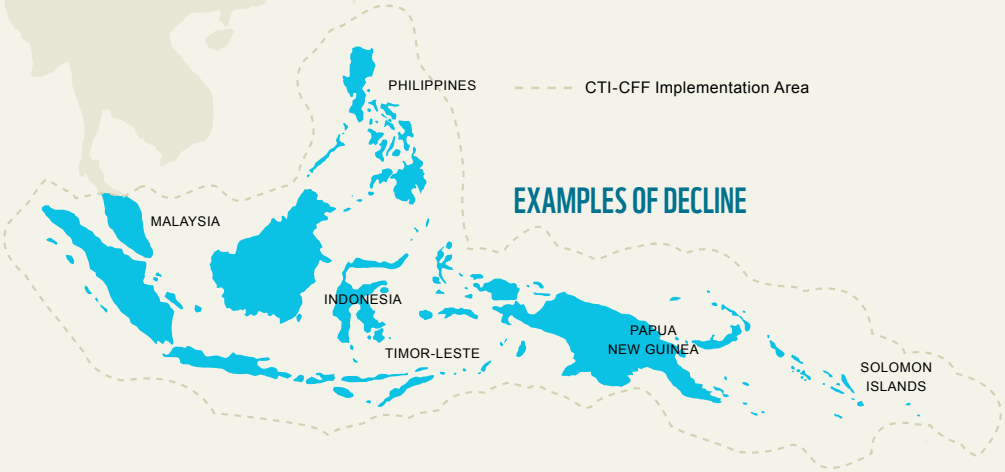
THERE ARE 27 SPECIES OF MARINE MAMMALS, INCLUDING DOLPHIN, WHALE, AND THE ENDANGERED DUGONG

One-third of the inhabitants of the Coral Triangle– more than 120 million people– depend directly on local marine and coastal resources for their income, livelihoods, and food security, and fish is a major source of protein in local diets. The total value of international fisheries exports from Coral Triangle countries in 2009 was approximately 1.35 million tons, worth nearly $3.8 billion (Fish Stat Plus 2009). This represents approximately 3.9% of the total value of the year's global fisheries exports.

The region's tuna industry, one of the largest in the world, is estimated at $1 billion annually, with high-volume exports to Europe, North America, and Asia. In 2009, more than 1.27 million tons of the principal market species of tuna were caught in the waters of the Coral Triangle (Fish Stat Plus 2010). Tuna, along with some other economic species, spend parts of their juvenile stage within the region before migrating to other areas within the Western and Central Pacific Ocean, which provides 11.2% of global fish catch (FAO 2008).

Home to 37% of the world's coral reef fish species and more than half of the coral reef fish species in the Indo-Pacific region, the Coral Triangle also benefits from a lucrative trade in live reef food fish (i.e. - fish captured on coral reefs and sold live for human consumption). In 2009, this trade was valued at more than $800 million annually (WWF, 2009).

Representing an even larger economic value, the marine wonders of the Coral Triangle attract tens of millions of visitors who spend major dollars to dive in the regions vast coral reefs or laze on a local beach. The Pacific Asia Travel Association pegs nature-based tourism in Coral Triangle countries at US $12 billion annually, with earnings shared by travel operators, tour guides, hotels, diving operations, and countless other businesses (Pet-Soede et al. 2011).



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INDONESIA

Decline in shrimp catch from 500 kg/ GT to 250-300 per year over past 2 decades

WESTERN EQUATORIAL REGION OF THE WESTERN AND CENTRAL PACIFIC OCEAN

Decline in spawning biomass of bigeye tuna 80 % and of yellowfin tuna 70% over past 60 years

SABAH, MALAYSIA

Decline in live reef food fish species: Napoleon wrasse estimated 78% over past 8 years

THREATS TO NATURAL CAPITAL

The increasing demand for fish, both globally and within the region has put these resources under stress. Overfishing, destructive fishing practices, harvesting of threatened and protected marine species, coastal development, and urbanization, together with climate change, have led to spectacular declines in natural capital. In the past 40 years, over 40% of the coral reefs and mangroves of the region have disappeared (WWF 2009a). As these ecosystems provide the habitat and breeding grounds for many fish species, there has also been a significant decline in fish stocks. For example, 79% of spawning aggregations of reef fish have stopped forming or are in decline in the Asia and Pacific region (Sadovy de Mitcheson Y et al. 2008). The development of aquaculture activities has also adversely affected the coastal environment, with large tracts of mangrove forests, swamps, wetlands, and even agricultural lands converted to aquaculture farms which contribute to coastal and marine pollution (UNEP/COBSEA 2010).

Climate change is now joining and intensifying the stresses that are affecting Coral Triangle ecosystems and people, threatening to undermine livelihoods and stability in a region that relies heavily on natural resources. In 2009, WWF commissioned leading climate

>50%

IF CURRENT CLIMATE TRENDS CONTINUE, THE ABILITY OF REEF SYSTEMS TO PROVIDE FOOD FOR COASTAL POPULATIONS IS PREDICTED TO DECREASE BY 50% BY 2050

change scientists to look at what kinds of impacts might be in store for the Coral Triangle's natural systems and people in the future. They found that if current climate trends continue, the ability of reef systems to provide food for coastal populations is predicted to decrease by 50% by 2050, and as much as 80% by 2100 relative to today's levels. Increases in seawater temperature will damage coral reefs, which are highly threatened by small surges in ocean temperatures. Coastal ecosystems are being degraded by warming, acidifying, and rising seas, which could cause the reef systems in the Coral Triangle to disappear and are putting more pressure on coastal communities and freshwater supplies. More violent weather events are predicted, causing floods, landslides, and severe storms in some areas and crippling drought in others (WWF 2009).

THE CORAL TRIANGLE INITIATIVE ON CORAL REEFS, FISHERIES AND FOOD SECURITY

In 2007, the governments of Indonesia, Malaysia, Papua New Guinea, the Philippines, Solomon Islands, and Timor-Leste launched the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI–CFF)[11].

Under this initiative, all six governments collaborated on developing a regional plan of action (RPOA) and national plans of action, designed to guide the implementation of future activities on country and local levels. At the CTI-CFF Leaders' Summit, held in Manado, Indonesia in May 2009, heads of state from the six governments signed a historic inter-state agreement adopting the RPOA.

Collectively, the plan provides a framework for addressing threats to the natural capital of the Coral Triangle region and has resulted in a number of activities showing early signs of success, some of which are described in the following sections.

Designating and managing priority seascapes

One of the goals of the RPOA is to identify and designate priority seascapes as a focus for cooperative management and targeted investments. The Sulu–Sulawesi Marine Ecoregion (SSME) has been recognized as one of these seascapes, and the governments of Indonesia, Malaysia and the Philippines have worked together to develop comprehensive action plans to address threats to the SSME's diversity and productivity. A Seascapes Guidebook has also been prepared by the non-profit organization Conservation International and its partners to provide guidance in the implementation of the Seascapes concept. It is

11. The Initiative is supported by the governments of Australia and the United States, ADB, the GEF, Conservation International (CI), The Nature Conservancy (TNC), and WWF. Under the umbrella of a GEF cofinanced CTI –CFF Program, three other partners are also involved—UNDP, FAO, and the World Bank.

now the focus of a series of planned regional exchanges between the six countries (Atkinson et al. 2011).

Applying the ecosystem approach to management of fisheries and to other marine resources

Ecosystem-based approaches to fisheries management (EAFM) aim to ensure that fisheries are planned, developed and managed in a way that addresses the needs and desires of today's societies without jeopardizing the options for future generations to benefit from marine ecosystems (FAO, 2011).

Ecosystem-based approaches to fisheries management (EAFM) aim to ensure that fisheries are planned, developed and managed in a way that addresses the needs and desires of today's societies without jeopardizing the options for future generations to benefit from marine ecosystems (FAO, 2011). In practice, this means building increased understanding of the interactions among different components of marine ecosystems such as fish, people, habitats and climate to enable fisheries to be better managed (USAID, 2011).

One of the major challenges for the region is to enforce biodiversity regulations and control illegal, unreported and unregulated (IUU) fishing. This includes trans-boundary issues such as overfishing, illegal cross-border fishing, and bycatch, the unintended catch of non-target species in fisheries of protected and endangered species. A number of development partners have joined forces to do work in these areas.

For example ADB, with cofinancing from the GEF, is implementing two projects on "Strengthening Coastal and Marine Resources Management in the Coral Triangle", one in Southeast Asia and the other in the Pacific. The projects will support research and application of monitoring and surveillance systems and will oversee the creation of a transboundary plan for IUU fishing of endangered species. In accordance with the FAO International Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported and Unregulated Fishing (FAO 2001), the projects aim to strengthen collaboration between national agencies that manage fisheries and the environment, and police and navies. Efforts are underway to create joint enforcement programs with better data and knowledge-sharing among Coral Triangle countries, and to have IUU fishing recognized as a transnational organized crime with increased prosecutions. The projects are also promoting hands-on approaches to supporting enforcement, such as introducing national and independent on-board observer programs, and encouraging the use of vessel monitoring systems to monitor the activities of large-scale and transboundary fishing fleets.

Bycatch is also a major problem in the Coral Triangle and it is impacting on species such as endangered marine turtles, which are being killed because of practices such as tuna longline and shrimp trawl fishing.

Fisherman pulling up a newly caught yellowfin tuna by hook and line, Indonesia

This is not just a conservation issue, but represents a major economic imperative as the marketplace is increasingly demanding sustainably-caught seafood and has given rise to some promising activities involving WWF, the private sector and communities.

Bycatch reduction and best management practices were important themes at the first Coral Triangle Fishers Forum held in 2010 in Indonesia, which brought together diverse stakeholders to discuss major fisheries issues. The Fishers Forum produced a series of commitments from industry, regional technical organizations and WWF, which included a pledge by three major fishing companies to join the regional Seafood Savers Program and an agreement by the Fisheries Research Institute of Philippines to promote further research to improve bycatch management efforts in the Coral Triangle.

Some key issues identified during the Fishers Forum were later included in a circle-hook policy brief developed by WWF for the Coral Triangle region, which focuses on innovative new bycatch technology as highlighted in Box 2.

80%

CIRCLE HOOKS CAN REDUCE THE HOOKING RATE OF MARINE TURTLES BY AS MUCH AS 80%

Box 2. Technological Solutions to Bycatch

Measures exist to effectively lessen the impacts on marine turtles of longline fisheries, with relatively few, if any, negative economic impacts on fishing communities. Studies have confirmed that the use of “circle” or “C” hooks—hooks which are sharply curved back in a circular shape—can reduce the hooking rate of marine turtles by as much as 80 % compared to traditional longline hooks, leading to significant reductions in mortality rates. C hooks have also been found to be less prone to swallowing compared to traditional hooks, improving post-hooking survival of marine turtles.

Another innovation, the turtle excluder device (TED), is a simple device that consists of an escape hatch at the back of shrimp trawls. The TED makes it possible for turtles to easily escape from a slow death. For smaller non-target species, the juvenile trash excluder devices (JTEDs) exclude objects smaller than the target species. In addition to preventing sea turtles from drowning, TEDs and JTEDs protect marine biodiversity by allowing other species to escape from trawl nets, benefiting

inshore fishing communities. WWF is promoting TEDs in the Sorong shrimp trawl fisheries in Indonesia that supply a major Japanese fish company, and circle hook trials and partnerships on developing bycatch best practices are underway with tuna longline fleets in Indonesia, the Philippines, and now in Papua New Guinea, Fiji, and Viet Nam. These projects also include links with retailers and suppliers. (WWF 2011f).

70%

THANKS TO CERTIFICATION, EIGHT TUNA CANNERS ACCOUNTING FOR 70% OF THE WORLD MARKET HAVE COMMITTED TO MAKING MANAGEMENT OF THE WORLD'S TUNA FISHERIES MORE SUSTAINABLE

To identify options to address bycatch, WWF sponsored a Tuna Think Tank in August 2010, which produced five prototype projects[12] to reduce the harvest and use of juvenile tunas, and a fund-raising and partnership drive has been launched to expand the tuna-tagging program (WWF 2010). WWF is also mobilizing stakeholders from the retail sector and the fishing industry to make the supply chain of tuna, shrimp, and live reef fish more sustainable.

A sound economic argument is a powerful driver of change in this regard, as evidenced by eco-labeling and independent certification programs that use market incentives to expand sustainable fishing and seafood production. There is a growing demand in the retail and consumer markets of key importing nations for more sustainably produced seafood, compelling the industry to adopt more sustainable fishing practices. Moreover, with increasing consumer demand for sustainably caught seafood, the onus is on suppliers to verify that their products meet certain standards.

Especially regarding wild-caught fish, many large retailers are now demanding that products carry a reliable eco-label such as that of the Marine Stewardship Council (MSC[13]). In addition, WWF has established a "gold" standard for assessing whether a fishery is well-managed and sustainable, aiming to encourage consumers to make more responsible choices and to send a signal to the marketplace. Thanks to certification, eight tuna canners accounting for 70% of the world market have committed to making management of the world's tuna fisheries more sustainable.

12 The five prototypes identified are (i) business-driven approaches to stop canning juveniles, (ii) financial incentives and cap-and-trade, (iii) documentary film, (iv) "get a new net" program, and (v) fish attraction devices (FADs) to tourist attraction devices (TADs).

13 The MSC was established in 1997 by WWF and Unilever to certify sustainably produced fish. See http://www.msc.org/.

Establishing and managing marine protected areas

The development of marine protected area (MPA) networks in all six Coral Triangle countries is an important step toward maintaining the region's ecosystems and biodiversity.

Well designed and effectively managed MPA networks can contribute to food security, livelihoods and lifestyles. These networks help protect key areas for fisheries such as spawning and nursery areas, safeguard habitats and species that attract marine tourism, and stop degradation of ecosystems that allow communities to better withstand the effects of climate change and natural disasters. The creation of a regional MPA network would maximize protection of the full range of fish, turtles and marine mammals.

The development of marine protected area (MPA) networks in all six Coral Triangle countries is an important step toward maintaining the region's ecosystems and biodiversity.

Key to an effective operation of MPAs is sustainable financing. A combination of payment for ecosystem services (PES) schemes and ecotourism projects can potentially cover the costs of managing a MPA. In the Philippines the WWF-sponsored Donsol project, which allows tourists to swim with whale sharks in the wild, is a successful example of how ecotourism can contribute to the conservation of the marine ecosystem and generate income for the local community.

Under the CTI-CFF, a number of projects are supporting the development of MPA networks, and a regional exchange between the six countries was held in July 2010 and March 2012 to discuss the design and operation of MPA networks and systems. An MPA Learning Network is being established to discuss and test various solutions towards achieving the MPA goals of the CTI-CFF Regional Plan of Action.

Developing and applying climate change adaptation measures

Addressing the expected impacts of climate change is another important component of the CTI-CFF. To date, a region-wide Early Action Plan for Climate Change Adaptation Measures has been prepared to help develop a common understanding of what climate change adaptation entails and to identify the most important adaptation measures that should be taken across the Coral Triangle countries.

In line with this plan, projects supported by a number of development partners are being developed and implemented. For example, ADB, with funding from the GEF's Special Pilot on Adaptation, aims to bolster the resilience of MPAs, coastal and marine resource systems, fisheries, and associated ecosystems to the effects of climate change and other threats. This will include undertaking vulnerability assessments that

HALTING THE DECLINE AND POTENTIAL EXTINCTION OF POPULATIONS OF SHARKS, SEA TURTLES, SEABIRDS, MARINE MAMMALS, CORALS, SEAGRASSES, MANGROVES

identify which coastal areas are especially at risk to sea-level rise, storm surges, and flooding, in order to support better planning processes and community-based projects in participating countries. The USAID Coral Triangle Support Program has also recently developed a Climate Change Adaptation Toolkit, and is supporting the development of climate change adaptation plans at national and local levels.

Improving the status of threatened species

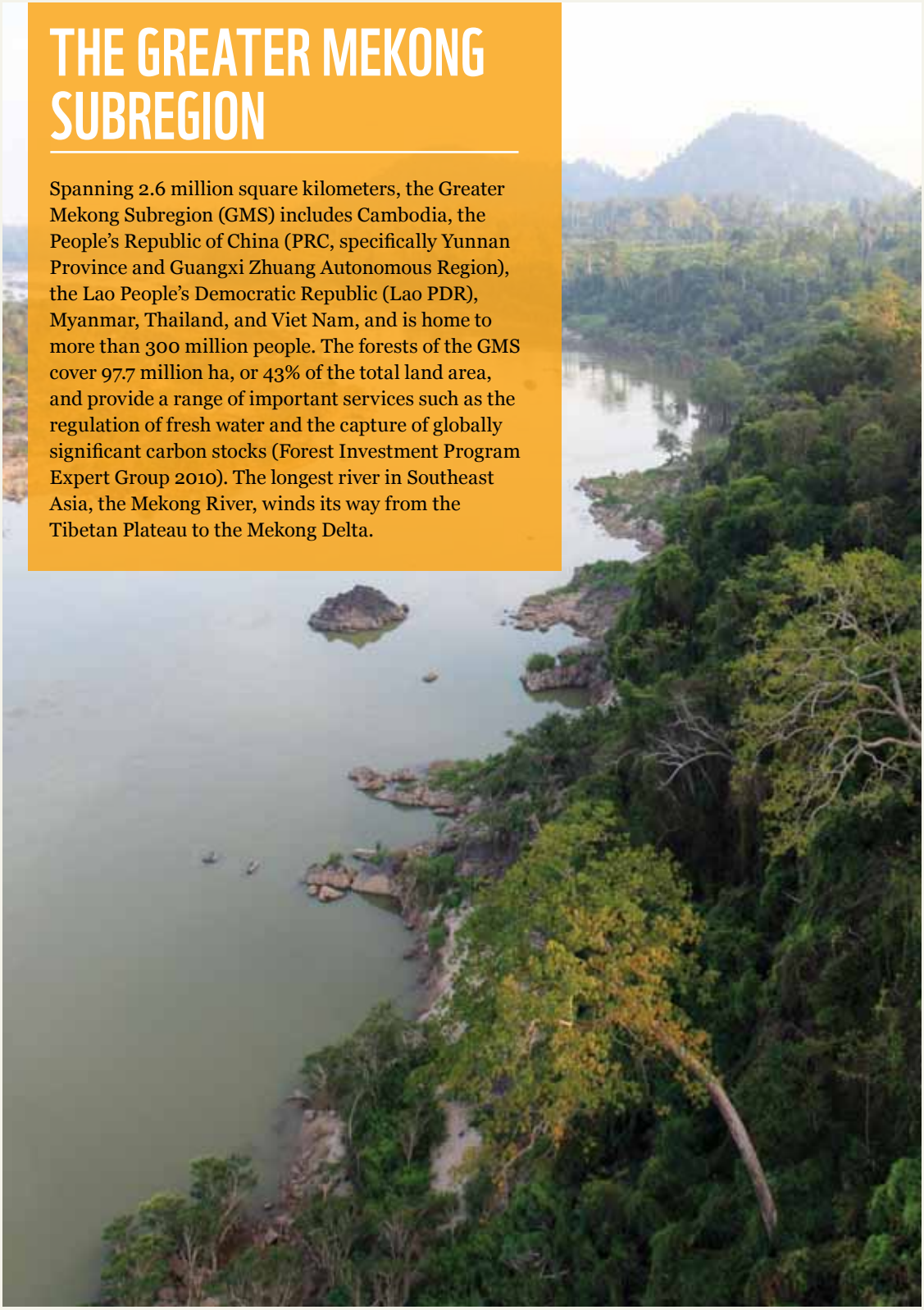
The CTI – CFF Regional Plan of Action envisions halting the decline and potential extinction of populations of sharks, sea turtles, seabirds, marine mammals, corals, seagrasses, mangroves and other identified threatened species by 2015. Conservation action plans will be developed for each species, building on the regional and national action plans. The issues surrounding species protection are complex, not least because they have multilateral dimensions. Many of these species are migratory, which makes it essential for countries in the region to coordinate their responses. The action plan specifically addresses cross-cutting concerns such as the impacts of international trade and shipping, the different habitat needs of migratory species during all stages of their life cycle, and the effects on threatened species of fishing by non- CTI-CFF countries during migrations.

Crosscutting activities

CTI–CFF partners are working together to undertake a range of crosscutting measures intended to support the goals of the initiative. This includes establishing a sound scientific and knowledge base and developing mechanisms to generate share and channel information and global best practices to enhance decision making. For example, ADB and the GEF's International Waters Learning Network are supporting a project on Knowledge Management for the Coral Triangle. In particular, the project aims to create a CTI-wide information exchange and learning network, establish communities of practice for each of the CTI-CFF target areas, and enhance policy-making through the provision of decision support tools.

THE GREATER MEKONG SUBREGION

Spanning 2.6 million square kilometers, the Greater Mekong Subregion (GMS) includes Cambodia, the People's Republic of China (PRC, specifically Yunnan Province and Guangxi Zhuang Autonomous Region), the Lao People's Democratic Republic (Lao PDR), Myanmar, Thailand, and Viet Nam, and is home to more than 300 million people. The forests of the GMS cover 97.7 million ha, or 43% of the total land area, and provide a range of important services such as the regulation of fresh water and the capture of globally significant carbon stocks (Forest Investment Program Expert Group 2010). The longest river in Southeast Asia, the Mekong River, winds its way from the Tibetan Plateau to the Mekong Delta.



1,100

THE MEKONG IS THOUGHT TO PROVIDE HABITATS FOR 1,100 SPECIES OF FISH

The GMS is one of the most biologically diverse places on the planet, while the Mekong River Basin is the richest river basin in the world in terms of fish stocks, providing a habitat for more than 1100 species. The basin's biodiversity and productivity are directly linked to its regular flooding cycle and to the connectivity of its land and water systems.

Between 1997 and 2008, 1,231 new species were discovered in the GMS, with 308 new species identified in 2008 and 2009 alone (WWF 2009b). The region is home to numerous endangered species, including the Indochinese tiger, the Asian elephant, the Irrawaddy dolphin, and the Mekong giant catfish. In particular, the GMS is rich in endemic species, including the deer-like annamite muntjac or saola, one of the world's rarest mammals. Most of this globally-important biodiversity extends across national borders, making regional cooperation vital for its long-term conservation.

ECONOMIC VALUE OF NATURAL CAPITAL

The GMS has been characterized by rapid economic growth over the past 20 years, and in the last decade, GDP growth has been sustained at an average of 6.5%. This economic expansion has been fuelled largely by exports and by tapping natural resources. Despite its impressive economic growth, the GMS remains relatively poor, with poverty levels ranging from 2% in Thailand to 44% in the Lao PDR (ADB 2010).

The rich natural ecosystems of the GMS provide a variety of benefits essential for sustainable development of the region. The Lower Mekong Basin (LMB) provides water, nutrients, fish and other aquatic resources for over 60 million people in Cambodia, the Lao PDR, Thailand and Viet Nam, 80% of whom depend directly on the river for their food and livelihoods (Baran and Myschowoda 2009; International Centre for Environmental Management [ICEM] 2010). The economic value of the Mekong River's ecosystem services is immense, with the value of capture fisheries alone estimated at $1.4 billion–$3.9 billion per year. This does not include the economic value of subsistence fisheries, which provide food for millions of people living in the basin. Agriculture

is the dominant economic sector in the Mekong River Basin and the ecosystem's freshwater resources are vital to the production of food. Freshwater fisheries, especially from wild capture, make up between 47 and 80% of animal protein consumed by the people living in the LMB (Hortle 2007). About 75% of the basin's population depends on agriculture and fisheries for their livelihoods (Mekong River Commission [MRC] 2010a).

In addition to sustaining highly productive fisheries, the Lower Mekong also carries sediment that builds up the Mekong Delta, creating alluvial floodplain and coastal habitat in Cambodia and Viet Nam. Flooding of the LMB also stimulates agricultural productivity through the provision of water and nutrients that support $4.6 billion in paddy rice production and $174 million – $574 million in riverbank gardens per year (MRC 2010a).

THREATS TO THE NATURAL ECOSYSTEMS AND BIODIVERSITY

The GMS has derived great economic benefit from its abundant natural resources or natural capital. Its water resources have been used for fisheries and hydropower, its land resources for increased agricultural production, its mineral resources for mineral-based industries, and its forest resources for timber and a range of other products such as fibers, wild foods and medicines.

However, these resources are often extracted and produced in an unsustainable way, which has led to significant losses in natural capital. Some of the key drivers that impact natural capital are outlined below.

Deforestation and forest degradation

Activities such as timber and fiber production, mining, illegal logging and the conversion of land to agriculture and other land uses have resulted in high rates of deforestation and forest degradation in the GMS. As a result, the overall forest area of the GMS contracted by 8.5 million ha between 1990 and 2005 (FAO 2010a). Although there has been a recent slowdown in the total rate of forest loss[14], due in part to an expansion of timber plantations, the loss of primary forest continues, particularly in Cambodia and the Lao PDR. Forest degradation, due to such factors as the over-collection of fuel wood, poor management of

14 Between 2000 and 2005, net forest cover declined at 0.7% per annum, compared to 1.2% per annum during the 1990s.

production forests, and extreme climatic events, is also a major concern, and can cause a reduction in the forest's biological productivity, capacity and diversity (FAO 2001b).

As a result, forests landscapes and river systems in the GMS are becoming increasingly fragmented and remaining ecosystems are smaller and isolated by other forms of land use. This can make it difficult for some animals to establish a breeding territory, and can force plants and animals to breed with close relatives, which can increase vulnerability to disease. When habitats are isolated, species also become more vulnerable to climate change, as their ability to migrate to areas with more favorable conditions is limited (Secretariat of the Convention on Biological Diversity 2010).

Changes in land use in the GMS are also giving rise to significant levels of greenhouse gas (GHG) emissions from the release of carbon trapped in soils and vegetation. For example, in 2005, GHG emissions from the transport sector were responsible for 9 percent of total emissions in the region, while emissions from land use change and forestry were responsible for 26 percent of total emissions (ADB 2011[15]). On a global level, these land use changes account for close to 6 percent of total forestry-related GHG emissions, even though the GMS has only 3 percent of the world's forested area.

2011

IN 2011, WWF AND THE INTERNATIONAL RHINO FOUNDATION CONFIRMED THE EXTINCTION OF THE JAVAN RHINOCEROS IN THE GMS

Species decline

The number of species and their population sizes are declining in the Mekong region. For example, in 2011, WWF and the International Rhino Foundation confirmed the extinction of the Javan rhinoceros (*Rhinoceros sondaicus annamiticus*) after the last remaining individual was shot and its horn removed. This extinction is a sad example of the broader extinction crisis facing the region.

Perhaps one of the most widely recognized species illustrating the gravity of the situation, is the tiger. Over the last century, 95% of the world's tiger population has vanished due to shrinking habitats, expanding human populations, increasing demand for traditional medicines and wild meat, and a decrease in prey species. In the GMS, only 350 Indochinese tigers remain, down from 1200 in 1998 (WWF 2010a), and many remnant populations are small and isolated.

For many Mekong fish species, essential migration routes[15] are being disrupted by hydropower development (Figure 14). More than 35% of the LMB fish harvest is however made up of long-distance migratory species, and the combined effects of dams already built on tributaries and the loss of floodplains to agriculture is expected to reduce fish catch by 150,000 to 480,000 tons between 2000 and 2015 (ICEM 2010). Tributary dams alone are expected to reduce total fish stocks by 10%–26% by 2030 and dams proposed for the mainstream of the LMB could cause a further 60%–70% loss of fish catch (Orr et al. 2011).

These problems may worsen, as twelve hydropower schemes have been proposed for the Lao PDR, Lao–Thai, and Cambodian reaches of the Mekong River (ICEM 2010). Hydropower development on the Mekong River is however an important regional issue and needs careful consideration given its significance for regional energy security and trade, and the potential impacts on biodiversity and ecosystems, fisheries, agriculture, and downstream communities .

MAINTAINING AND RESTORING ECOSYSTEMS AND BIODIVERSITY IN THE GMS

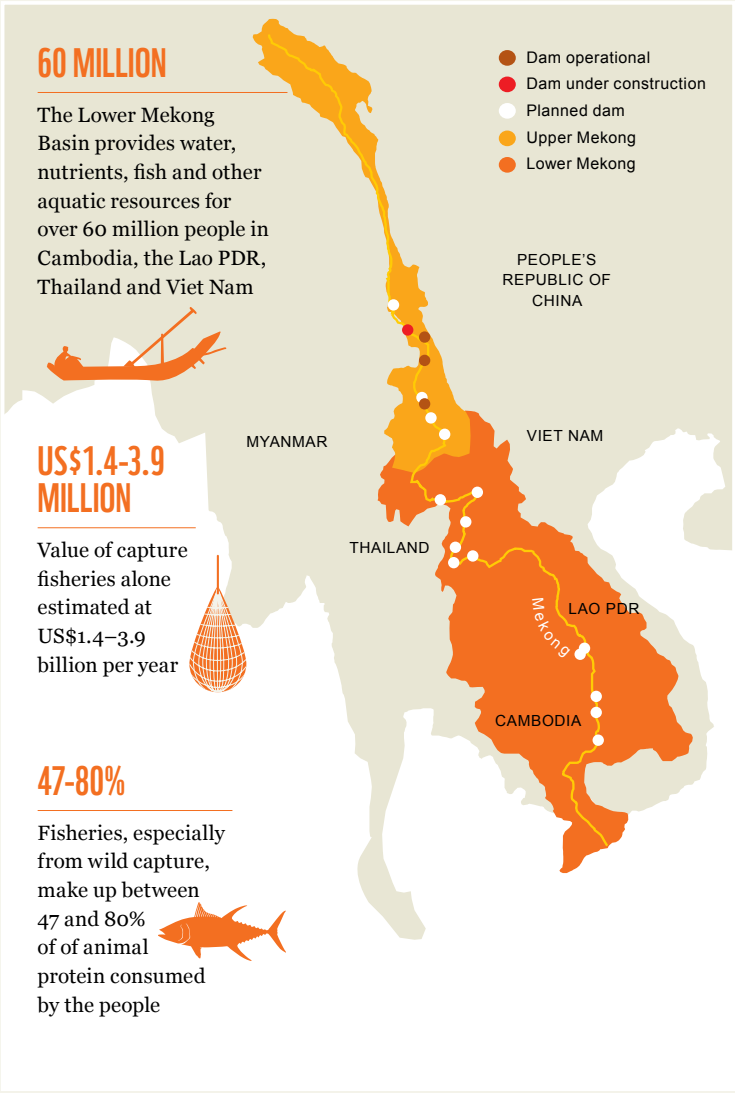
Regional cooperation

In 1992, the six countries of the GMS launched a broad economic cooperation program with support from ADB and other partners, in order to strengthen economic relations and build on their shared histories and cultures. The primary sectors and themes covered by the program are agriculture, energy, environment, human resource development, investment, telecommunications, tourism, transport infrastructure, and transport and trade.

15 Migration routes are essential for a natural life cycle, as species spawn upstream and in tributaries and return downstream to feed.

The magnificent tiger is the largest of all cat species. It is also one of the most threatened – with an estimated 3,200 left in the wild

Figure 14: Existing and Planned Dams on the Main Stem of the Mekong River



The boundaries, colors, denominations, and any other information shown on the map do not imply any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries, colors, denominations, or information

2002
THE FIRST GMS SUMMIT, HELD IN CAMBODIA IN NOVEMBER 2002, BROUGHT TOGETHER THE HEADS OF ALL SIX GMS COUNTRIES

The First GMS Summit, held in Cambodia in November 2002, brought together the heads of all six GMS countries and endorsed a Ten-Year Strategic Framework that envisioned a well-integrated, harmonious and prosperous GMS. A second GMS Summit, held in the PRC in 2005, established the GMS Core Environment Program and Biodiversity Conservation Corridors Initiative (CEP-BCI). This landscape-based conservation program is carried out under the institutional framework of the GMS Economic Cooperation Program, with core support from ADB and other partners -notably the Governments of Finland, the Netherlands and Sweden. With national and regional activities in areas such as biodiversity conservation, climate change, energy, strategic environmental assessment and capacity development, the program supports the goal of a poverty-free and ecologically rich GMS.

More recently a new Strategic Framework (2012–2022) was endorsed at the fourth GMS Summit held in Myanmar in 2011. The framework emphasizes the importance of coordination and linkages between sectors, and of striking a balance between development and environmental protection. The Framework also endorses a second phase of the CEP-BCI from 2012–2016 to consolidate and enhance gains made on preserving and utilizing the regions natural assets. This will be done by strengthening development planning systems, methods and safeguards, and improving the management of conservation landscapes for sustainable livelihoods.

With respect to water resources in the region, the Mekong River Commission (MRC) has been established as inter-governmental agency that works directly with the governments of Cambodia, the Lao PDR, Thailand and Viet Nam on joint management of shared water resources and the sustainable development of the Mekong River. While not formally member countries, the two upper states of the Mekong River Basin – Myanmar and the PRC – are dialogue partners. As a regional facilitating and advisory body, the MRC aims to ensure that the waters of the Mekong are developed in the most effective way. Since its establishment in 1995 by the Mekong Agreement, the MRC has adopted a number of rules and procedures on water issues and acts as a regional knowledge hub on several key issues such as fisheries, navigation, flood and drought management, environment monitoring and hydropower development.

Integrated landscapes and climate resilience

The six GMS governments have identified the most important biodiversity conservation landscapes in the subregion that are vulnerable to development pressures and environmental degradation. To address the increasing fragmentation of these landscapes, the CEP-BCI and other programs aim to maintain and re-establish interconnected biodiversity corridors within well-planned and managed economic development areas.

Under the first phase of the CEP-BCI from 2006, the GMS countries piloted a biodiversity conservation landscape management approach in priority areas, supported by ADB and other partners. Initially, six biodiversity corridors were designed, with two in Cambodia, one in the PRC, one in the Lao PDR, one in Thailand, and one in Viet Nam. By 2009, two additional sites were added, one in the PRC and another in Viet Nam. The eight biodiversity corridors cover a mixed landscape of over 2 million ha of forest. The approach focuses not only on improving landscape connectivity through the restoration of forests and better land management practices, but also on alleviating poverty by developing local livelihoods, improving infrastructure, and establishing sustainable financing mechanisms. In addition, work supporting this approach has been undertaken at national levels, including the preparation of a new Biodiversity Law in Viet Nam, and the completion of Environmental Performance Assessments to help government institutions monitor and assess how well they are achieving national environmental targets.

Based on the encouraging results so far, a second phase of the CEP-BCI program will be implemented between 2012 and 2016 with a focus on environmental planning systems, trans-boundary conservation landscapes, and climate change. ADB has also approved a $69 million package of grants and loans to Cambodia, the Lao PDR, and Viet Nam to scale up activities through a GMS Biodiversity Conservation Corridors Project (GMS BCC) that will cover an area of more than 1.93 million hectares and will involve over 170,000 mostly poor, upland farmers and indigenous communities.

The project will help to restore habitats in over 19,000 ha of degraded forest land by planting native trees and other plants, and its integral capacity building component will provide training to national and provincial agencies and community groups on how to plan and sustainably manage forests. The project is also supporting security of land tenure for poor households and ethnic minority groups, giving

them greater ownership of the forest resources they depend on for their livelihoods. Women will be an integral part of the labor team, carrying out the restoration work, while more than 4,770 households and over 4,000 farmers will receive cash and technical support.

Within the same landscapes as the CEP-BCI, the Carbon and Biodiversity Project (CarBi) is being implemented to halt deforestation and preserve unique species diversity in an area of forest along the Annamite Mountain Range that links Viet Nam and the Lao PDR. This will be largest project in WWF's history of working in the Greater Mekong, and aims to protect and restore forest landscapes and reduce global green house gas emissions by an estimated 1.8 million tons.

The CarBi project has four key focus areas: (i) reducing carbon dioxide emissions by assessing carbon stocks of the forests and training government officials in protected areas management; (ii) surveying species populations within the protected areas to demonstrate that improved management is increasing biodiversity levels; (iii) reducing cross-border trade in illegally cut timber by 40% between 2011 and 2014 through increased cooperation between border officials, WWF, and partners; and (iv) ensuring that local communities benefit from the sustainable use of natural resources.

170,000

GMS BCC PROJECT TARGETS 170,000 MOSTLY POOR FARMERS

In addition to reducing carbon dioxide emissions, the CarBi project is expected to contribute to a 15% increase in the income of 400 households, with benefits to 5,000–7,000 people in villages across the region; protect populations of mammals, allowing for their numbers to increase in the protected areas; and reducing trans-border illegal timber trade by 40% in the project region.

Building on the CEP-BCI and CarBi work, a new GMS Forests and Biodiversity Program is being developed as collaborative effort by ADB and the World Bank, with funding from the Global Environment Facility (GEF) and support from various stakeholders. Given the large-scale forces that are driving the decline in forest in the region, the program seeks to align the GEF and other programs to improve management of forest biodiversity conservation areas. In particular, it will help with trans-boundary issues such as conservation policies and planning, illegal trade in wildlife and forest products, long-term sustainable financing, and information exchange between GMS countries to advance regional knowledge on common challenges

Strategic planning and assessments

In a dynamic and rapidly growing region like the GMS, strategic planning and assessment tools are needed to ensure that environmental and social safeguards are addressed and opportunities for green growth are captured within decision-making. Since its inception in 2006, the CEP-BCI has helped to demonstrate the usefulness of planning support tools such as geographic information systems (GIS), and strategic environmental assessments (SEAs). For example, a transport- related SEA was undertaken for the GMS North-South Economic Corridor Strategy and Action Plan. The pilot SEA assessed the plan against a series of sustainable development goals using spatial modeling tools. This included assessments of the plan's impacts on hard and soft infrastructure (eg health care, education), and its orientation towards avoiding and minimizing the loss of biodiversity and ensuring adaptation and mitigation of climate change. The assessment considered several development scenarios and provided a range of recommendations to the planning teams, including guidance on the alignment of the development corridors to avoid environmentally and socially vulnerable areas (Ramachandran and Linde 2011).

To meet rising electricity demand, more than 60 hydropower projects had been proposed for the Vu Gia-Thu Bon River Basin, raising concerns about the environmental and social impacts

The SEA of the Quang Nam Hydropower Plan in Viet Nam is another example of a successful application of this tool. It was the first SEA undertaken following the requirements of Viet Nam's revised Law on Environmental Protection in 2005. To meet rising electricity demand, more than 60 hydropower projects had been proposed for the Vu Gia-Thu Bon River Basin, raising concerns about the environmental and social impacts. Using GIS data analysis and participatory processes among stakeholders, the assessment identified a number of potential impacts, including the fragmentation of natural ecosystems and fish habitats, potential reductions in water supply for downstream communities, social and economic impacts on ethnic minority groups, and unforeseen economic costs associated with the management of environmental impacts. Among the SEA's strategic-level recommendations were proposals integrated procedures for the operation of the dams to ensure water availability for downstream uses, and a proposal for a rivers policy to maintain migration routes for fish in priority areas of the basin. Since its completion, there has been progress in implementing these recommendations, including the announcement of a freeze on all hydropower development within the Song Thanh Nature Reserve (Dunn et al. 2012).

Pak Mun dam, Ubon Ratchathani Province, Thailand

Sustainable financing incentives

In the framework of the GMS, different payment schemes are being tested with the dual aims of sustainably financing the conservation of natural capital and improving incomes for local communities and indigenous peoples. One approach is the development of payment for environmental services (PES) schemes. "A payment for environmental services scheme [ES] is a voluntary transaction in which a well-defined environmental service or a form of land use likely to secure that service is bought by an ES buyer from an ES provider on the basis that the ES provider continues to supply the service." (Wunder 2005).

50%
PILOT AREAS RECEIVING PAYMENTS WERE REPORTEDLY BETTER PROTECTED, WITH ILLEGAL LOGGING OFFENCES DOWN BY 50%

In Viet Nam in 2008, a pilot policy for payments for forest ecosystem services established initial sites in Lam Dong and Son La provinces. Under the policy, forest protection and development, and the conservation of forest ecosystems, biodiversity and landscapes, were considered ecosystem services. Individuals, businesses and organizations using and benefiting from those services paid the service providers—in this case, forest owner organizations and households contracted for forest protection. At the Lam Dong pilot site, hydropower and water supply plants decided to invest $5.2 million in forest management in order to improve water quality and regulate water flow. The funds were used to make payments to participating forest-managing households. After almost two years, the results were encouraging. Pilot areas receiving payments were reportedly better protected, with illegal logging offences down by 50% and poverty rates reduced by 15%. The initiative also raised public and private sector awareness about the mechanism and benefits of forest ecosystem services payment and how they can contribute to local livelihoods, eco-tourism, clean water supply and sustainable hydropower (Son 2010).

Reducing Emissions from Deforestation and Forest Degradation (REDD+), discussed previously in relation to initiatives in the Heart of Borneo, is another approach to generate financial revenues for forest conservation. Because of their high levels of forest cover, the countries of the GMS have a huge potential to reduce carbon emissions from deforestation and forest degradation (ADB 2010) and receive financing under REDD+ for the management of forest ecosystems and local community development. The REDD+ approach offers opportunities for countries with large forested areas to be compensated for maintaining their forests by parties who would like to offset their carbon emissions. To date, four of the GMS countries (Cambodia, the Lao PDR, Thailand and Viet Nam) are participating in one or more of the multilateral REDD+ support mechanisms, which offer exciting new opportunities,

but also require good coordination and strong social and environmental safeguards. Cambodia and the Lao PDR have established national coordination mechanisms dedicated to REDD+, while Thailand and Viet Nam have opted to make REDD+ an important new responsibility of their forestry ministries.

Thailand, with support from WWF and Germany's Federal Environment Ministry (BMU), is using REDD+ financing to design a sub-national REDD+ project, and to create a nation-wide forest carbon base map and a permanent forest carbon monitoring system. This project also allows for acquired knowledge, skills, experiences, and lessons learned to be communicated and transferred to other countries.

REDD+ programs have also been implemented under the UN REDD Programme in Viet Nam and Cambodia. One project in Viet Nam's Lam Dong province is a pilot for assessing the results of training and capacity building for REDD+ readiness. A preliminary assessment undertaken for FAO in 2011 also concluded that Viet Nam is well placed to benefit from REDD+ as a result of many years of experience with national reforestation programs such as the 'Five Million Hectare Reforestation Programme.' Potential revenues, depending on the price of carbon, could generate from $ 80-100 million per year. Given the transboundary nature of forests in the GMS and the regional trade dimension – including ongoing illegal trafficking in forest products –close attention will be needed to ensure that better protection and management of forests in one country does not lead to increased deforestation pressure in neighboring countries with weaker management systems.

Protected areas are often seen as the "backbone" of biodiversity protection and it is clearly the case that the Greater Mekong's protected areas contain a disproportionate amount of the region's biodiversity

Threatened species protection and management

Protected areas are often seen as the "backbone" of biodiversity protection and it is clearly the case that the Greater Mekong's protected areas contain a disproportionate amount of the region's biodiversity. The region's protected area network represents 11.5 % of its overall land area and this may expand in the future based on country commitments to the United Nations Convention on Biological Diversity.

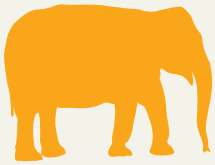
However, the region's protected areas and biodiversity face numerous threats including encroachment, habitat degradation, and targeted poaching and collecting of numerous protected species. Inadequate funding and staffing, weak management and growing markets for illegally harvested species and their derivatives are often at the root of the problem. Protecting this diversity and the benefits it confers is a huge endeavor, with the patterns and drivers of illegal poaching, trade, and consumption of biodiversity extending far beyond the boundaries

of protected areas. Multi-faceted approaches are therefore needed to address the problem.

WWF, for example, is supporting various research and other activities to protect endangered species of the Greater Mekong. With the help of new survey techniques, an accurate and up-to-date estimate of the Mekong Irrawaddy dolphin population has been produced. In a successful project in Viet Nam, dedicated forest guards were tasked with protecting the critically endangered saola by patrolling and removing thousands of illegal snares in areas where the saola is believed to be found. In Cambodia and Thailand, ongoing conservation-science projects are providing invaluable data on the status of tiger, tiger prey, and elephant populations. Work has also started in Thailand to support two additional protected areas in the Western Forest Complex – one of the region's main biodiversity conservation landscapes – and across the region, a program has began to discuss how to raise enforcement and management standards in all WWF's priority protected areas.

It may be said that the endangered tiger has become the globally recognized "face" in the battle to prevent species extinction. The Global Tiger Recovery Program (GTRP) plays an important role in GMS biodiversity conservation, as the GMS comprises of five of the 11 countries where tigers still exist in the wild. Only the Lao PDR, Myanmar, and Thailand have breeding populations, while Cambodia and Viet Nam have a small number of individual animals. The survival of the tiger and of many other species found in tiger habitats depends to a large degree on joint, coordinated management of trans-boundary landscapes and regional cooperation to combat poaching and illegal trade in tigers and tiger parts. The GTRP, endorsed at the St. Petersburg Tiger Summit in November 2010, provides a concrete framework for national governments to demonstrate that they are committed to regional cooperation.

In Cambodia and Thailand, ongoing conservation-science projects are providing invaluable data on the status of tiger, tiger prey, and elephant populations.



Sustainable hydropower and water resource management

Wild capture fisheries are increasingly under threat due to hydropower development and other impacts on freshwater systems. Just as with the drive to save the tiger, the issues are complex and extend beyond national boundaries.

To address this, the Mekong River Commission (MRC) has been working together with various partners to ensure more sustainable planning, design and operation of hydropower projects. Key target groups, such as governments, financial institutions, developers and civil society are

working together to promote sustainable hydropower development on selected Mekong tributaries, develop standards and risk assessments, and introduce innovative technologies as alternatives to traditional hydropower designs.

RSAT

THE RSAT HAS BEEN SUCCESSFULLY APPLIED IN SIX MEKONG SUB CATCHMENTS

State-of-the-art sustainability assessment tools such as the Hydropower Sustainability Assessment Protocol and the Rapid Basin-wide Hydropower Sustainability Assessment Tool (RSAT) have been developed to speed up the introduction of sustainable hydropower projects in the Mekong Basin.

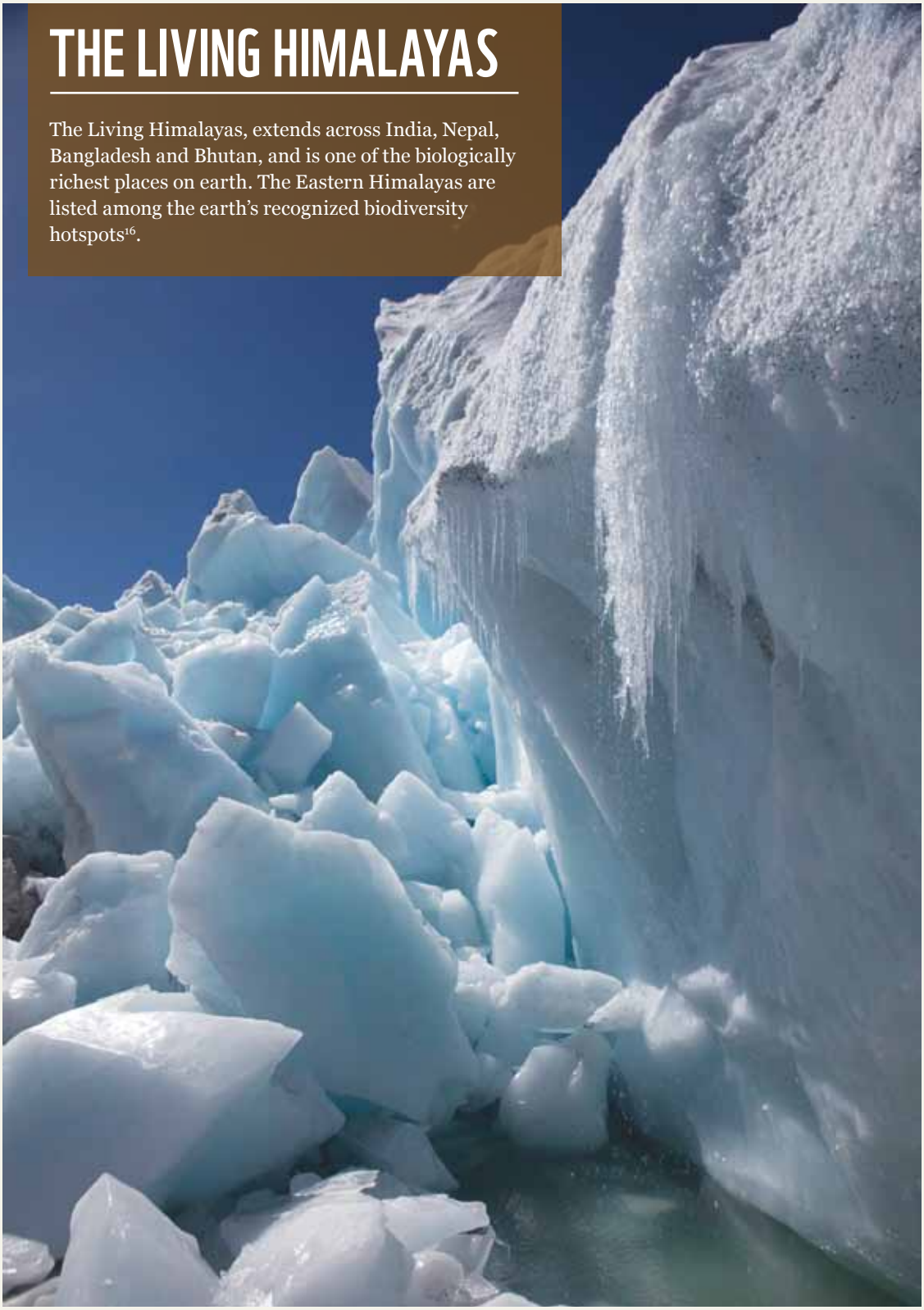
The RSAT (ADB, USAID 2010) assesses potential hydropower projects within a basin-wide context, taking into account the cumulative impacts, both upstream and downstream. Based on an integrated water resource management approach, the RSAT has been successfully applied in six Mekong sub catchments, and has helped to facilitate an integrated planning process involving all stakeholders.

Innovative technologies such as the Thakho hydropower project in the Southern Lao PDR, which do not involve dam-building, can potentially allow for economic development of these huge water resources without compromising fisheries and other sources of natural capital. The project design, allows electricity to be produced while limiting negative environmental impacts associated with traditional dam designs.

In 2011, the MRC also endorsed two key strategies: the Integrated Water and Related Resources Management Strategy, and the 2011-2015 Strategic Plan, both of which provide a more comprehensive direction for the agency. In the same year, the MRC commissioned a SEA of Hydropower in the Lower Mekong Basin (LMB) in order to fill in the knowledge gaps about the impacts of mainstream dams on LMB fisheries and other natural capital. The report highlighted some important concerns, including that the mainstream projects would disrupt connectivity of the Mekong ecosystem, and would have significant impacts on the basin-wide movement of water and sediment. This would have implications for the water supply of downstream villages and towns, and the supply of nutrients that fertilize downstream land.

THE LIVING HIMALAYAS

The Living Himalayas, extends across India, Nepal, Bangladesh and Bhutan, and is one of the biologically richest places on earth. The Eastern Himalayas are listed among the earth's recognized biodiversity hotspots[16].



Seven main rivers, including the Brahmaputra and the Ganges, are fed by the Eastern Himalayas and provide freshwater for approximately a billion people in the region (Xu et al. 2009).

10,000
THE AREA HARBOURS 10,000 PLANT SPECIES

The area harbors 10,000 plant species, 977 kinds of birds, 269 freshwater fish, 176 reptiles, 105 amphibians, 300 mammals, including tigers, Asian elephants, endangered snow leopards, and the world's rarest freshwater dolphins. A third of all plants and reptiles are unique to the region, as are 40% of all amphibians. From 1998 to 2008, more than 350 new species have been identified here, and many more have yet to be discovered (WWF 2009c).

ECONOMIC AND SOCIAL VALUE OF NATURAL CAPITAL

Mountains have an ecological, aesthetic, and socioeconomic significance for those living in the mountain areas and beyond. People depend directly and indirectly on Himalayan resources, such as water, hydroelectricity, timber, biodiversity and minerals, for their livelihoods and well-being. Himalayan freshwater and terrestrial ecosystems provide many important services, such as the regulation of the climate and water, soil formation, and enrichment of cultural diversity and recreation. They also act as important carbon sinks. For instance, the ecosystems in the Indian Himalayas alone are estimated to hold about 5.4 billion tons of carbon, roughly equal to the annual carbon emissions from fossil fuels from all of Asia (Singh 2007).

Much of the population of the Eastern Himalayas lives below the

A pair of Tibetan Snowcocks (Tetraogallus tibetanus) near Kala Patthar, Himalayas, Nepal

16 To qualify as a biodiversity hotspot on Myers 2000 edition of the hotspot-map, a region must meet two strict criteria: it must contain at least 0.5% or 1,500 species of vascular plants as endemics, and it has to have lost at least 70% of its primary vegetation (Myers et al 2000).

poverty line, depending for their subsistence on an integrated farming system of crop agriculture, livestock rearing and use of forest products. These communities rely extensively on the area's ecosystems for energy (fuel wood), fiber, food and fodder.

The bulk of the freshwater flowing in the Ganges and Brahmaputra rivers is rain-fed. The Himalayan ecosystems act as sponges that soak up this rain water and then gradually release it, keeping the rivers flowing over time. Freshwater provided by the ecosystems is vital for crops such as sugarcane, rice, and wheat, and is increasingly important for hydropower development to meet the region's energy needs. Degradation of these freshwater and terrestrial ecosystems will result in an increasing mixture of floods and lean periods of flow, affecting the region's agriculture, power generation and water supply. The river connections and the ecosystem services flowing from the Himalayas also play a vital role in shaping the rise of cultures in the Gangetic plains and the Brahmaputra basin.

THREATS

Despite their important contributions, mountain ecosystems are under severe threat. Increasing human populations and haphazard infrastructure development, combined with unsustainable resource use and low investment in conservation, have led to habitat degradation, biodiversity loss, and decreased agricultural productivity. Extensive modification of vital ecosystems may be affecting natural processes and reducing their capacity to provide ecosystem services, as well as leaving communities more vulnerable to impacts of climate change.

2/3

IN THE GANGES, THE LOSS OF GLACIER MELT WATER COULD REDUCE JULY-SEPTEMBER FLOWS BY TWO THIRDS

Climate change

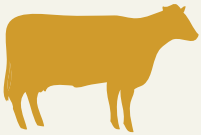
Climate change is accelerating the melting of glaciers in the Himalayan region. In the short term, this is expected to cause an increase in river levels in the next few decades, leading to higher incidence of flooding and land-slides. In the long-term, as the volume of ice available for melting diminishes, a reduction in glacial runoff and river flows can be expected. In the Ganges, the loss of glacier melt water could reduce July-September flows by two thirds, causing water shortages for 500 million people and 37 per cent of India's irrigated land (WWF 2005). Climate Change can also affect the sustainability of energy supplies from hydropower and may exacerbate problems associated with altered natural flows caused by the construction of dams.

Glacier Lake Outburst Floods (GLOFs) are another serious threat posed by the impacts of climate change in the Eastern Himalayas. They cause devastation for downstream communities, hydropower stations and other infrastructure. Records show that in this region, the frequency of GLOF events has increased in the second half of the 20th century (WWF 2005 and Mool, et al. 2001).

Habitat loss, degradation and fragmentation

Fuelwood and fodder collection are two major causes of habitat degradation, causing changes in species composition. Trekking tourism also increases demand for fuelwood and timber for building lodges and other tourist facilities.

Extensive grazing by domestic livestock is a major cause of biodiversity loss throughout the Eastern Himalayas



Conversion of forests and grasslands for agriculture and settlements is also fragmenting habitats, and is most intense in Nepal and the Indian States of Sikkim and Assam. Extensive grazing by domestic livestock is a major cause of biodiversity loss throughout the Eastern Himalayas. The species-rich alpine meadows, when overgrazed by large herds of domesticated yak, become dominated by a few species of unpalatable shrubs. In the lowlands and mid-hills, the forests grazed by herds of cattle have lost all undergrowth, and no longer possess or support the natural ecosystems and associated biodiversity. The alpine meadows are also threatened by the commercial collection of plants used in traditional medicines, large quantities of which are collected for export.

Species loss

Poaching and unsustainable hunting for commercial wildlife trade are major threats to the flagship species of the Eastern Himalayas. The demand for tiger and rhinoceros parts, which are highly prized in East Asian medicine, places these species under extreme threat. The rhinoceros, which became locally extinct from important high-profile protected areas such as Manas Tiger Reserve in India, has only recently been reintroduced. Open borders encourage poaching, as the probability of being caught is low while the economic returns are high.

Wildlife killing also results from conflict with humans. Retaliation against tigers and snow leopards for killing livestock, and against elephants and rhinoceros for crop depredation, is prevalent and continues to intensify as humans and wildlife compete for land. The North Bank Landscape in India is a prime example of intense human-elephant conflict with fatalities on both sides brought about by extensive and ad hoc land clearing and encroachment of forestlands.

Panoramic view of the Everest Range Himalayas.

Infrastructure

Development in the Eastern Himalayas has been accompanied by a greater demand for energy. The construction of numerous hydroelectric dams without due environmental impact assessments could lead to the submergence of thousands of square kilometers of arable lands and biodiversity hotspots. Not only would valley habitats be inundated by the creation of reservoirs, but villagers would be displaced, usually to more marginal lands. Although very little is known about the seasonal migration patterns of fish in the Himalayan rivers, the effect of dams on fisheries and fish ecology may also be a matter of concern. The majority of rivers and streams in the Eastern Himalayas originate from glacial melt. The runoff supplies communities with water for drinking, irrigation and industry, and is also vital for maintaining river habitats. A change in these water flows could have dramatic impacts downstream.

INITIATIVES – BUILDING RESILIENCE TO CLIMATE CHANGE

At the recently concluded Climate Summit for a Living Himalayas 2011 in Bhutan, four countries – Nepal, Bhutan, India and Bangladesh – adopted a "Framework of Cooperation" to build resilience to climate change in the Eastern Himalayas. The Framework outlines four main areas for focus and cooperation: securing biodiversity and ensuring its sustainable use; ensuring food security and securing livelihoods; securing the natural freshwater systems of the Himalayas; and ensuring energy security and enhancing alternate technologies. The summit and its outcomes have created a regional vision supported by civil society, the public and private sectors and development partners such as ADB, UNDP and WWF, to protect and sustainably develop the region's common resources for future prosperity. This cooperative effort promises to result in real progress in tackling climate change issues in the Eastern Himalayas, thereby securing the natural resources, ecosystem functions and livelihoods for millions of people throughout the region.

As a follow-up to the Summit, WWF and other development partners are working with the countries in the Eastern Himalayas to support the further development and implementation of the agreed cooperation framework

The Climate Summit for a Living Himalayas called for action to create a mosaic of conservancy areas to restore and reconnect natural landscapes across the Eastern Himalayas, protecting plant and animal species and ensuring that the needs of local communities are met without negative impacts on the environment. A seven million hectare trans-boundary Himalayan conservation complex is to be created, stretching from central Nepal across Bhutan to Arunachal in northeastern India. It is intended to provide full connectivity across 1,500 kilometers and ensure ecological integrity, especially for forest and freshwater ecosystems.

Improving adaptation and resilience

Adapting to climate change involves having a better understanding of its impacts on river systems in order to build resilience. In Bhutan, for example, a major effort is underway to prevent the Thorthormi Tsho glacial lake from bursting (Box 3). The work is being done by a team of hundreds of workers from throughout the country, including farmers, yak herders and women, who are draining the lake by channeling the water elsewhere. This is one of many local success stories of climate change adaptation in action. Adaptation strategies at the community level are designed to be locally appropriate, and are developed in close collaboration with the communities themselves. This includes advising farmers on crop diversification and choice of agricultural practices under changing climatic conditions. Governments are also being assisted to ensure that adaptation is integrated into local development planning and river management, and that any new hydropower plants are sustainable and adhere to environmental regulations.

CLIMATE CHANGE

ADAPTING TO CLIMATE CHANGE INVOLVES HAVING A BETTER UNDERSTANDING OF ITS IMPACTS ON RIVER SYSTEMS IN ORDER TO BUILD RESILIENCE

Next steps

A key task of all the stakeholders will be to view the management of the Himalayan ecoregion from a holistic perspective. Given that the area is a source of freshwater for the entire region, the vast mosaic of landscapes and development issues must be addressed by bringing people, governments and industry together, and developing plans that straddle borders, link landscapes, build resilience to the impacts of climate change, and sustain sources of freshwater. If successful, this collaborative effort could achieve a balance between development and nature in the Himalayas by providing water and resources for people while protecting biodiversity and giving wildlife room to thrive.

Agricultural worker Pangbuche Chosang Sherpa

As a follow-up to the Summit, WWF and other development partners are working with the countries in the Eastern Himalayas to support the further development and implementation of the agreed cooperation framework.

In its Living Himalayas Initiative (LHI), WWF is leveraging resources for regional scale success, which involves moving beyond 'business as usual' and taking a longer term, trans-boundary perspective. A key element of this work will be the development of strategic partnerships with groups and bodies in the region that have mandates and accountability. In addition WWF is helping implement the outcomes of the Climate Summit for a Living Himalayas in Bhutan, which marked a significant milestone for the southern slopes of the Eastern Himalayas.

The Pilot Program for Climate Resilience in Nepal under the Climate Investment Funds of the multilateral development banks is well aligned with the areas of focus of the Framework of Cooperation. Under the Government's Strategic Program for Climate Resilience, interventions will aim to provide lessons on how best to approach building climate resilience in vulnerable mountain regions. The Program will support, strengthen, and facilitate the scaling up of interventions that will build long-term climate resilience in Nepal including (i) building Climate Resilience of Watersheds in Mountain Eco-Regions; (ii) building Resilience to Climate-Related Hazards; (iii) mainstreaming Climate Change Risk Management in Development; (iv) building Climate Resilient Communities through Private Sector Participation; and (v) enhancing Climate Resilience of Endangered Species. The Program will be supported by ADB, the World Bank and the International Finance Corporation.

Box 3. Artificial Drainage of a Glacial Lake in Bhutan to Prevent GLOF

Thorthormi Tsho is a glacial lake perched precariously at 4428 meters above sea level in the remote Lunana area of northern Bhutan. Rated as one of Bhutan's likeliest future catastrophes, a breach and outburst flood through Thorthormi Tsho's unstable moraine walls would most likely spill into the also vulnerable Raphsthreng Tsho lake 80 meters below, with the combined flood suddenly releasing up to 53 million cubic meters of water and debris into the upper catchment of the Po Chu river. In a valley still bearing the scars of the 1994 Glacial Lake Outburst Flood (GLOF), which took more than 20 lives and devastated villages and wrecked transport and power facilities, the prospect is terrifying.

For Bhutan, scenarios from such a GLOF include crop destruction and livestock losses over more than half of the fertile Punakha and Wangdi valleys, loss of a vital bridge and roads, and damage to hydropower facilities under construction. A 14th century royal palace and religious centre called Punakha Dzong is one of 16 historic monuments at risk, along with numerous other buildings such as vocational centers and a famous weekend market.

2009

IN 2009, THE GOVERNMENT OF BHUTAN AND UNDERTOOK AN AMBITIOUS EFFORT TO KEEP THE WATER LEVELS FROM THORTHORMI LAKE FROM REACHING THE THRESHOLD

In 2009, WWF joined the Government of Bhutan and partners in an ambitious effort to keep the water levels from Thorthormi Lake from reaching the threshold. The artificial drainage of the lake aims to demonstrate how practical measures can improve the capacity to reduce risks of other potentially dangerous glacial lakes in Bhutan and elsewhere.

A team of over 300 workers from 20 districts of Bhutan and from all walks of life – tourist guides, farmers, women and yak herders – walked for up to 10 days to reach the site and dig and realign existing outlet channels to safely drain water from the lake. The team braved thin and frigid air and harsh weather conditions including the arrival of Cyclone 'Aila' in May 2009.

Through a united effort by the government and communities, with support from WWF, the Global Environment Facility (GEF), the United Nations Development Programme (UNDP) and the Austrian Coordination Bureau, the project has been successful lowering the lake level by 86 cm. The project aims to artificially lower the water level by 5 meters by 2015.

Royal Chitwan National Park, Terai Arc Landscape, Nepal

SOME LANDSCAPES OF SPECIAL SIGNIFICANCE

The Sacred Himalayas	The Sacred Himalayan Landscape covers an area of 39,021 square kilometers, of which about 70% is in Nepal, 24% in Sikkim, India, and the remaining 2% in Bhutan. Sacred Himalayas is a transboundary conservation area that boasts a mosaic of habitats – from broadleaf and conifer forests to alpine meadows and high altitude freshwater lakes, springs and rivers. The area is also home to diverse peoples and cultures and is rich in biodiversity, harboring species such as the red panda and the globally threatened snow leopard. Conservation organizations and other development partners are working to safeguard the biological and cultural treasures of the world's sacred mountains and valleys, while protecting the rights of local people to resources and ensuring that their livelihoods are enhanced and sustained.
Bhutan Biological Conservation Complex	Covering over 50% of the country, Bhutan's Biological Conservation Complex is a network of national parks, wildlife sanctuaries, nature reserves and biological corridors that allows tigers, snow leopards, rhinos and other wildlife to move between Protected Areas. The Government of Bhutan is working closely with other partners to address conservation threats including deforestation, poaching, overgrazing and human-wildlife conflict.
The North Bank and Kaziranga-KarbiAnglong	Located in the foothills of the Himalayas of northeast India, the lush evergreen forests and grasslands of the North Bank Landscapeare home to extraordinary wildlife: tigers, rhinos and one of the region's largest populations of elephants. Millions of people also live in the region, including many distinct tribal communities. On the south side of the mighty Brahmaputra River lies the Kaziranga-KarbiAnglong landscape, with 70% of the world's greater one-horned rhinos and densest populations of tigers. Kaziranga National Park, along with the connecting KarbiAnglong hills, is one of the few places on Earth with such a diverse range of large mammals, from tigers, elephants, and rhinos, to wild buffaloes and swamp deer. Of the 500 bird species in the landscape, 25 are globally threatened.
Terai Arc Landscape	Covering 15 protected areas in India and Nepal, the Terai Arc Landscape is home to endangered tigers, elephants and vulnerable rhinos, and is one of the few places in the world where these three threatened mammals coexist. In this part of the Eastern Himalayas, a significant part of the conservation effort is focused on the restoration and community management of forests. Other activities include reducing pressure in forest areas through the use of alternative energy, as well as strengthening anti-poaching measures and reducing human-wildlife conflicts.

CONCLUSION

Many countries of Asia and the Pacific have seen dramatic improvements in human development and poverty reduction. However, there has also been considerable growth in national Ecological Footprints, and reductions in per-capita biocapacity in many countries.

Currently, the average citizen of the Asia and Pacific region requires 1.6 global hectares (gha) of biologically productive land and sea to support the consumption of food, fiber, timber, energy, and space for infrastructure and to absorb their carbon dioxide emissions, while only 0.9 gha is available. For most countries, this gap is widening. Region-wide, the biocapacity available per person in 2008 was two thirds of that available in 1960. In a world of increasingly diminishing resources, there is greater dependency upon imports of natural resources, leaving countries that do not have enough domestic biocapacity vulnerable to rising and volatile prices for resources.

Our common challenge is to achieve higher levels of social and economic development while reducing poverty and the degradation of natural capital and ecosystem services that underpin livelihoods and the natural environment. Strategies are needed that result in more sustainable use of biocapacity and greater efficiency in resource use. Without such measures, a growing deficit in the region will result in further depletion of natural capital and biodiversity. This will in turn impact the multiple benefits that people receive from nature, such as water purification and flood control by wetlands. This report has presented several strategies and tools to help meet this challenge.

Countries in the region are responding in a range of positive ways by developing a number of very promising regional cooperation programs such as the Heart of Borneo Initiative, the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security, the Greater Mekong Subregion Core Environment Program, and the Living Himalayas Framework for Cooperation. These programs recognize that many critical large-scale ecosystems such are public goods that provide massive benefits for human welfare and require coordinated management at national and regional levels. This report has explored some of the key challenges, opportunities and experience from these programs and has identified four important approaches that can be used address declines in natural capital:

Young boy in traditional dug-out canoe, Western Province, Papua New Guinea

Improving strategic planning and assessment processes

Approaches such as strategic environmental assessments (SEAs) and spatial analysis and decision support tools can improve upstream decision making and contribute to the protection of natural capital. For example, the SEA of the Strategy and Action Plan for the GMS North-South Economic Corridor provided an important opportunity to work with national and regional planners to consider alternative development scenarios against agreed sustainable development goals. Approaches such as this can provide opportunities for considering green growth opportunities as well as environmental and social safeguards at an early stage in the planning process. These types of tools can be most effective when they are developed in consultation with all stakeholders securing understanding, ownership and confidence in both the methodology and the results.

Expanding protected areas networks and integrated land and seascapes

Protected areas are a cornerstone of conservation efforts and now cover nearly 13% of the world's land surface and 2% of its oceans. Recognizing their importance, most of the world's governments have now committed to expanding these areas to cover 17% of terrestrial areas and 10% of coastal and marine areas by 2020. However, many existing protected areas are poorly managed and underfunded. Given that more than 1 billion people—a sixth of the world's population—depend directly or indirectly on these areas for a significant percentage of their livelihoods, further efforts will be needed to ensure that the ecosystem services provided by protected areas can be maintained.

Well-managed protected areas are at the core of the four initiatives presented. In the heart of Borneo alone, there are an estimated 4 million ha of protected areas, with over 1 million more planned. One important approach being promoted in the region is the linkage of protected areas through well managed forest corridors and conservation landscapes. The establishment of a network of functioning nature reserves, parks, and responsibly-managed logging concessions would vastly improves the chances that the Heart of Borneo can meet its ecological and economic needs. The protected areas can provide ecosystem services for tourism, sustainable timber, non-timber forest products, drinking water, and carbon storage. Recognizing this, the governments of Brunei Darussalam, Indonesia, and Malaysia have taken collective action and have agreed to identify, assess and establish networks of transboundary conservation zones. Similar approaches are being adopted in other parts of the Asia and Pacific region including

the GMS and the Coral Triangle. As described in this report, these efforts show great promise for protecting ecosystems and biodiversity, enhancing food security and livelihoods and helping communities to deal with the effects of climate change and natural disasters.

Establishing financial mechanisms for the conservation of natural capital

Establishing conservation areas is one thing, but ensuring that they are sufficiently funded is an even greater challenge. This report has presented different mechanisms that can provide financial incentives for the conservation of biodiversity while at the same time reducing poverty. In particular, various examples of mechanisms to establish payments for ecosystem services (PES) have been considered. PES schemes reward those whose lands provide ecosystem services, with subsidies or market payments from those who benefit. PES and other financial mechanisms can provide effective instruments to leverage finance from the private sector and can support resource mobilization beyond over the long-term.

One form of PES is provided by proposed mechanisms for Reducing Emissions from Deforestation and Forest Degradation (REDD). This is an effort to create a financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. "REDD+" goes beyond the consideration of deforestation and forest degradation and seeks to maintain and/or enhances forest biodiversity and ecosystem services, while strengthening the livelihoods of forest-dependent communities and recognizing and respecting the rights of indigenous peoples and local communities. Because of their high levels of forest cover, the countries of the Greater Mekong Subregion and the Heart of Borneo have a huge potential to reduce carbon emissions by addressing ongoing deforestation and forest degradation. In these countries REDD+ schemes could provide important new financing to assist this process.

Promoting green business practices

As shown through a number of examples in this report, the business sector can play a catalyzing role in the region's effort to protect natural capital. For example, several multi-stakeholder initiatives have set up certification schemes which guarantee to buyers that products have been sourced and produced sustainably. These initiatives can reduce the impact of human consumption and can lead to changes in supply chains

and the management of natural ecosystems. The Marine Stewardship Council (MSC) for instance, was founded in 1997 by WWF and Unilever to certify sustainably produced fish. While in the starting years the market share of sustainably caught fish was low, consumer interest and therefore the interest of large multinational retailers has risen. As a result, 10 % of the global market is now certified as using sustainable fishing practices, and eight tuna canners who account for 70% of the global market are now working together to drive sustainability into the management of the world's tuna fisheries.

Palm oil is another important global commodity where production needs to urgently shift towards more sustainable practices. The Roundtable on Sustainable Palm Oil (RSPO) was formed in 2004 with the objective of promoting the growth and use of sustainable oil palm products through credible global standards and engagement of stakeholders. In the Heart of Borneo currently 8 % of privately owned concessions are producing sustainable palm oil, which is grown in plantations established on suitable degraded land instead through the clearing of primary forest. Three years after the first barrel of sustainable palm oil entered the market, 13 % of global palm oil production has been certified as being sustainably produced.

The way forward

The approaches outlined in this report are a snap-shot of some of the promising ideas that can help drive the urgent need to move forward on green growth in Asia and the Pacific. They provide valuable experiences from the region that can be shared globally.

With continuing economic growth in the Asia and Pacific region, the demand for natural resources will grow. The increasing need for water, food and energy combined with the decreasing availability of these resources requires us to come up with solutions that go beyond "business as usual". As we look ahead, it will be important for various stakeholder groups to continue to work together to find innovative solutions that are tailored to local situations and needs.

Importantly, protecting and maintaining natural capital clearly require integrated approaches that link locally-driven efforts, with engagement by the private sector and efforts to implement better policies, strategies, regulations, incentive mechanisms and capacities at national and regional levels.

The large-scale ecosystems presented in this report provide numerous services to the region's inhabitants and global citizens. Regional cooperation between countries to sustain this natural capital has resulted in several key initiatives that contribute to more effective management of these important ecosystems. These initiatives demonstrate the commitment of the governments and their partners to scale up and replicate a range of promising strategies and approaches such as those presented in this report. Importantly, the leadership shown by the countries can provide a shining example for others on how regional cooperation can contribute to a healthier planet and greater human well-being.

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ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
BCI	Biodiversity Conservation Corridors Initiative
CBD	Convention on Biological Diversity
CarBi	Carbon and Biodiversity Project
CEP	Core Environment Program
CTI–CFF	Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security
EAFM	Ecosystem Approach to Fisheries Management
EPA	Environmental Program Assessments
FAO	Food and Agriculture Organization of the United Nations
FBP	Forests and Biodiversity Program
GDP	gross domestic product
GEF	Global Environment Facility
gha	global hectare
gha/capita	global hectare per capita
GHG	greenhouse gas
GIS	geographic information systems
GMS	Greater Mekong Subregion
GT	gross tonnage
GTRP	Global Tiger Recovery Program
ha	hectares
HoB	Heart of Borneo Initiative
IRF	International Rhino Foundation
IPCC	Intergovernmental Panel on Climate Change
IUU	illegal, unreported, and unregulated
JTED	juvenile trash excluder device
kg	kilogram
Lao PDR	Lao People's Democratic Republic
LMB	Lower Mekong Basin
LPI	Living Planet Index
MEA	Millennium Ecosystem Assessment
MPA	marine protected area
MRC	Mekong River Commission
MSC	Marine Stewardship Council
PA	Protected Area
PES	Payment for Ecosystem Services
PRC	People's Republic of China
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RSAT	Rapid Basin-wide Hydropower Sustainability Assessment Tool
RSPO	Roundtable on Sustainable Palm Oil
SEA	Strategic Environmental Assessment
SSME	Sulu–Sulawesi Marine Ecoregion
TED	turtle excluder device
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
WWF	World Wide Fund for Nature

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FOOTPRINT

The average person in the Asia–Pacific region requires 1.7 global hectares, while only 0.9 global hectares of biologically productive area is available. India and the People's Republic of China are likely to have the greatest absolute increase in Ecological Footprint by 2015.

OPPORTUNITY

With 3.7 billion people and rapidly growing per-capita wealth, Asia and the Pacific will be key to global efforts to build a green economy.

NATURAL CAPITAL

The Coral Triangle, the Living Himalayas, the Heart of Borneo and the Greater Mekong subregion provide socially and economically valuable services – such as food and fiber resources, clean water and climate regulation – that are fundamental to human welfare.

DEVELOPMENT

Increasing scarcity of resources will affect all economies. The impact of environmental degradation is felt most directly by the world's poor. Without access to clean water, land or adequate food, fuel or materials, these vulnerable populations will find it difficult to break out of the cycle of poverty and embrace prosperity.

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Why we are here

To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

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