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SUMMARY

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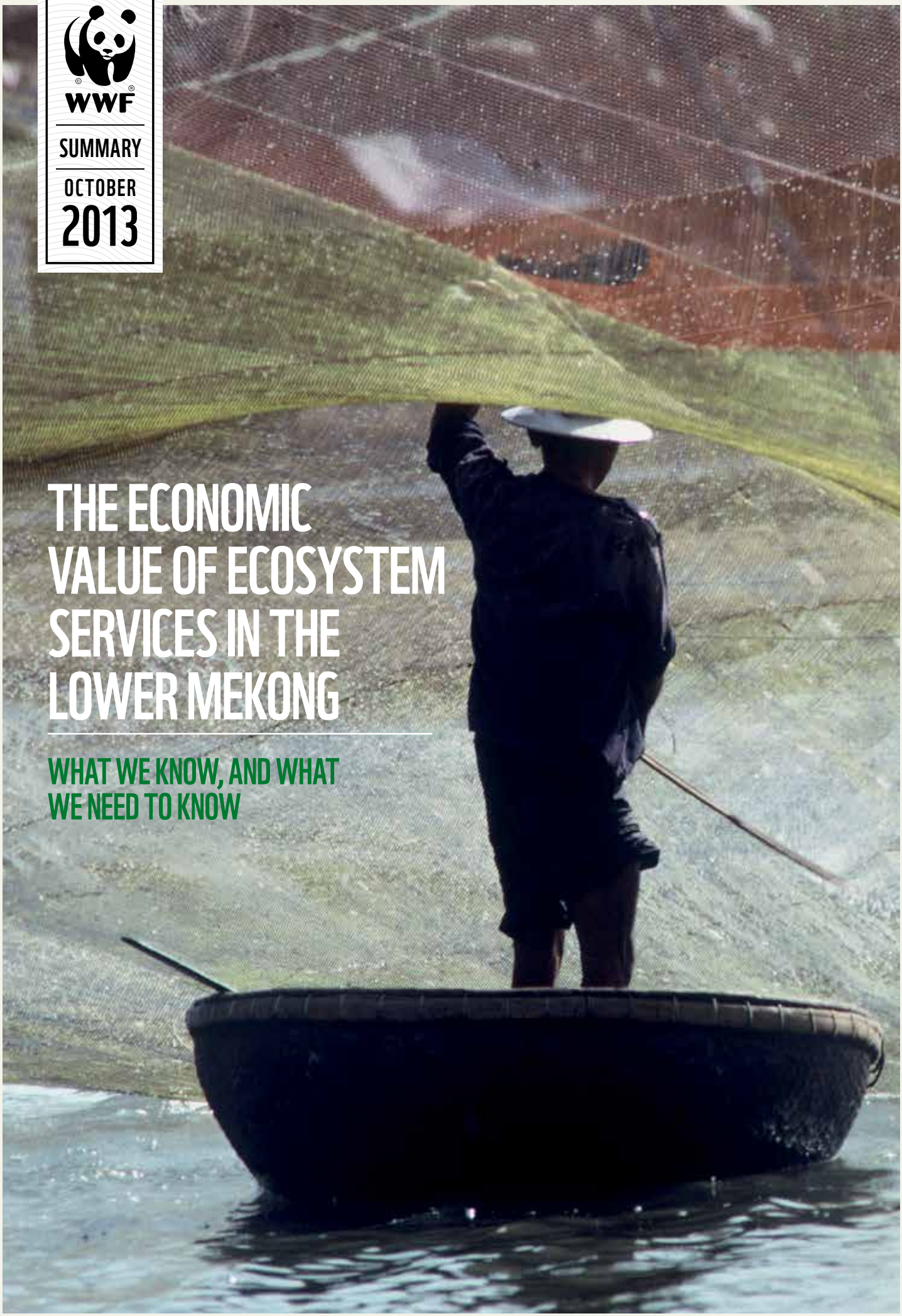
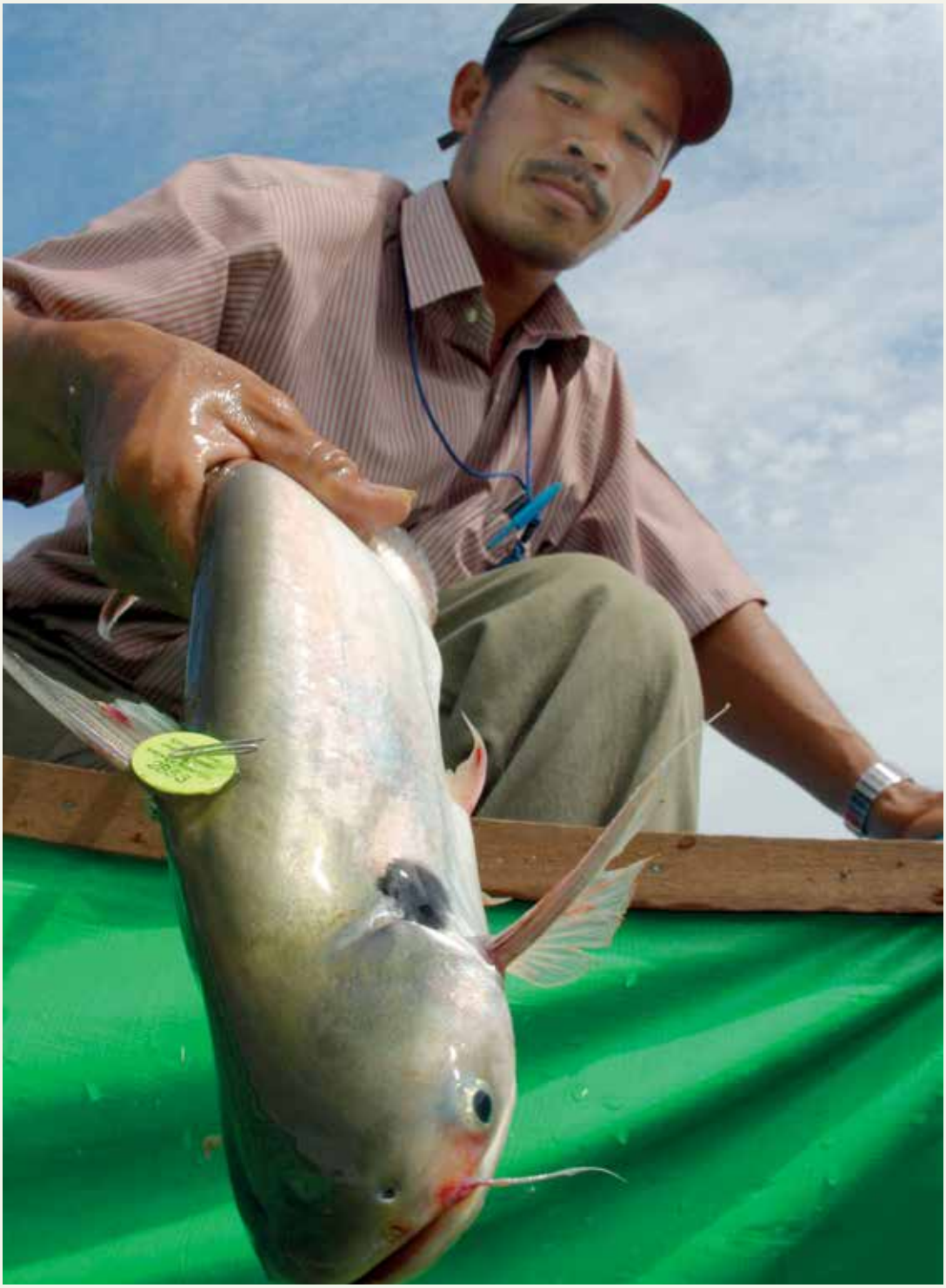


THE ECONOMIC VALUE OF ECOSYSTEM SERVICES IN THE LOWER MEKONG

WHAT WE KNOW, AND WHAT WE NEED TO KNOW



A tagged black-eared catfish (*Pangasius larnaudei*) in the Tonle Sap River, Cambodia.

INTRODUCTION

The natural ecosystems of the Lower Mekong, and the resources and other services they provide, are of huge economic importance to the region. However, governments, businesses and investors often fail to account for the value of natural capital in their decision-making. This is partly because of a lack of credible, specific evidence of the value of ecosystem services.

25 YEARS

FAILING TO TAKE ACTION TO CONSERVE ECOSYSTEMS COULD COST THE LOWER MEKONG COUNTRIES ALMOST US$55 BILLION OVER THE NEXT 25 YEARS

As a first step to filling this gap, WWF has compiled an ambitious Economic Analysis of Ecosystem Services in the Lower Mekong Region. This comprehensive report draws on the best available data and techniques to quantify the economic value of ecosystems in Cambodia, Laos, Thailand and Vietnam at local, national and regional levels, and the costs and benefits of managing them sustainably now and in the future.

Even with limited data available, it is clear that ecosystem services provide huge economic value, and that the countries of the Lower Mekong will gain more from conserving ecosystems than from allowing them to be exploited unsustainably. A simple comparison of two scenarios – one based on continuing with business as usual, the other based on principles of green economic growth – suggests that failing to take action to conserve ecosystems could cost the Lower Mekong countries almost US$55 billion over the next 25 years.

WWF has produced this report as a starting point for dialogue. Key questions include how stakeholders think ecosystems are likely to change in the Lower Mekong, and what future ecosystem services must be guaranteed if Lower Mekong countries are to achieve the economic growth and social development goals set out in their green growth strategies and policies. Investment is required in generating more information on the economic value of ecosystem services, and joining the dots between this information and real-world policy decisions.

Vegetable sellers at a market near Da Nang, Central Vietnam.

WHAT ARE ECOSYSTEM SERVICES, AND WHY DO WE NEED TO VALUE THEM?

Natural ecosystems provide a range of services that benefit people. These include:

- **Provisioning services:** goods obtained directly from nature (e.g. food, medicine, timber, fuel)
- **Regulating services:** benefits obtained from the regulation of natural processes (e.g. water filtration, waste decomposition, climate regulation, crop pollination)
- **Supporting services** that keep ecosystems functioning (e.g. nutrient cycling, soil formation)
- **Cultural services:** non-material benefits that people gain from nature (e.g. through tourism and recreation, aesthetic pleasure, relaxation, spiritual enrichment)

ECOSYSTEM SERVICES ARE CRITICAL TO HUMAN WELL-BEING AND TO THE FUNCTIONING OF THE ECONOMY

Ecosystem services are critical to human well-being and to the functioning of the economy. However, since they are delivered naturally and are often free to use, they are regularly taken for granted. Without ready-made "costs" or "benefits" to describe the impact of their loss or maintenance, they are difficult to incorporate into the typically monetary-based decision-making tools used by government and private companies. The returns on investment in maintaining or improving natural capital are not always easy to measure. Nature's "economic invisibility" means that investments in maintaining biodiversity, for example, will consistently appear less worthwhile for society than, say, expanding unsustainable agricultural land use.

Valuation of the public and private goods and services delivered by ecosystems is necessary if we are to understand what is lost through inappropriate development choices, such as increasing loss of forest cover in vital watersheds, and what can be gained from pursuing development pathways that are more sensitive to maintaining natural capital. Similarly, it enhances our understanding of the opportunity cost of biodiversity conservation; that is, the potential losses incurred through choosing to conserve our natural capital through, for example, protected areas or hunting bans. In cases where land development makes sense, it helps us understand what essential ecosystem functions need to be kept to avoid undermining the fundamental flow of services.

There are three aspects to looking at the economic value of ecosystems:

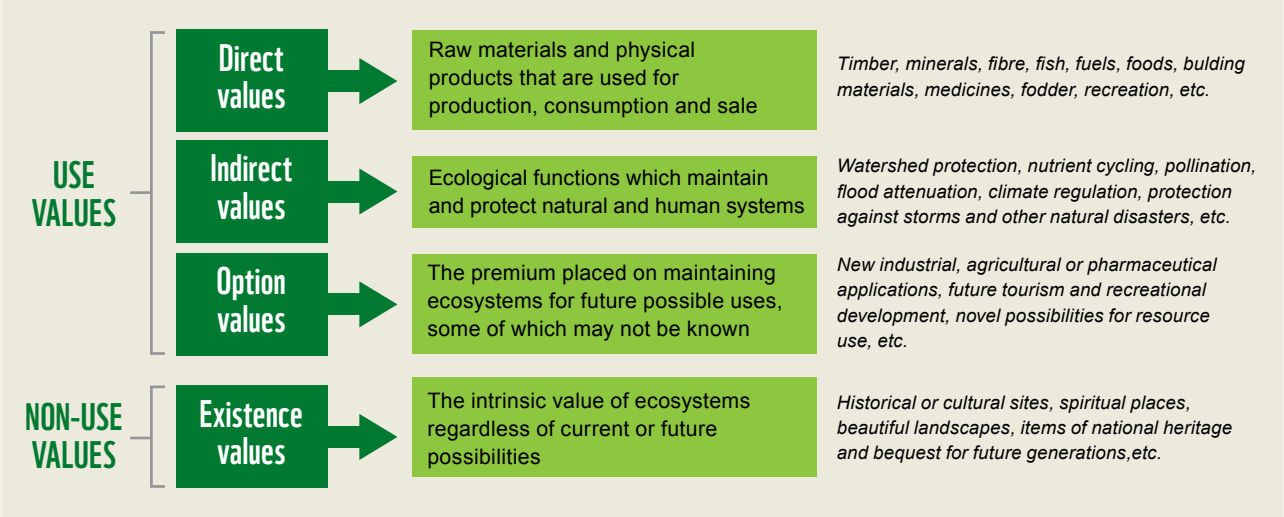
- **Ecosystems as assets** – a stock of natural capital, which, if conserved and managed sustainably, yields a
- **Flow of economically valuable goods and services** – the return on investments in conservation, which in turn contributes towards
- **Positive economic and human well-being outcomes** – the measures and indicators which are used to judge progress in economic growth and human development

This study attempts to capture the total economic value (TEV) of ecosystems, which includes:

- **Direct values**: the raw materials and physical products that are used directly for production, consumption and sale such as those providing income, energy, shelter, foods, medicines and recreational facilities

- **Indirect values:** the ecological functions that maintain and protect natural and human systems through services such as maintenance of water quality and flow, flood control, microclimate stabilization and carbon sequestration
- **Option values:** the premium placed on maintaining a pool of species and genetic resources for future possible uses, some of which may not be known now, such as leisure, commercial, industrial, agricultural, and pharmaceutical applications and water-based developments
- **Existence values:** the intrinsic value of ecosystems and their component parts, regardless of their current or future use possibilities, such as cultural, aesthetic, heritage and bequest significance

Total economic value (TEV) of ecosystems



APPROACHES TO ECOSYSTEM VALUATION

Production function approaches relate changes in the output of a marketed good or service to a measurable change in the quality or quantity of ecosystem goods and services.

Surrogate market approaches look at the ways in which the value of ecosystem goods and services is reflected indirectly in people's expenditures, or in the prices of other market goods and services.

Cost-based approaches look at the market trade-offs or avoided costs from maintaining ecosystems for their goods and services.

Stated-preference approaches ask consumers to state their preferences directly – for example by asking them what they would be prepared to contribute to maintaining a national park or conserving a particular species.

ECOSYSTEM SERVICES: THE POLICY CONTEXT

Economies in the Lower Mekong are growing rapidly. Escalating land, resource and infrastructure demands, combined with a rapidly growing human population and increasing integration into regional and global markets, mean that biodiversity and ecosystem services in the Lower Mekong are on a pathway of gradual decline and degradation.

At the same time, climate change is affecting regional ecological productivity in ways that may encourage even greater pressures on the natural system and cause progressively greater stresses to human and economic systems.

THE COUNTRIES OF THE LOWER MEKONG HAVE RECOGNIZED THE PRESSURE THAT THE HUMAN FOOTPRINT PUTS ON NATURAL RESOURCE STOCKS

The countries of the Lower Mekong have recognized the pressure that the human footprint puts on natural resource stocks, and have announced their vision of a "poverty free and ecologically rich" region to be achieved through "a green, inclusive and balanced economy". However, in green economies, natural capital is incorporated into measurement of societal progress and equity, and recognized and managed as a fundamental pillar of economic and human well-being. This region must demonstrate success in living up to commitments to maintain ecosystem integrity before claims to having 'greened' growth can be made.

A first step in making this commitment is ensuring that there is adequate information available on the socioeconomic importance of ecosystems and the services they provide. Ecosystem services valuation is a basic component of the evidence base for decisions to invest or divest in maintaining natural systems. If the contribution of healthy ecosystems to equitable economic development and growth is made visible to all, then choosing between keeping those benefits or losing them in place of receiving others becomes a transparent choice rather than a de facto outcome of development.

In this regard, what is missing in the Lower Mekong countries is good information for:

- Mapping the supply and demand of natural capital stocks and ecosystem service flows, and assessing the extent to which their threatened status affects the economies of the region
- Qualitative assessment of the contribution of these services to human well-being
- Quantitative and monetary assessment of the contribution of these services to human well-being

The ability to measure the true impacts of further biodiversity losses or returns on investment in conservation will aid in policy decision-making and policy design for greening economies.

HOW OUR STUDY WORKS

We chose four broad categories of ecosystems as the focus of this report: forests, freshwater wetlands, mangroves and coral reefs. By reviewing the available literature and building up a database of estimates of the value of the various services these ecosystems provide, we came up with an average per-hectare value for each ecosystem.

Comparing the current area of each ecosystem with projected areas under possible future scenarios gives us an idea of how changes to these ecosystems will affect the value of the services they deliver by 2035.

There is a fairly substantial, and rapidly growing, body of literature on the economic value of ecosystem services in the Lower Mekong. However, the data is not always reliable. Estimates of ecosystem values vary widely, and many are vague and approximate. The coverage of existing studies is patchy and incomplete. With few exceptions, figures are based on some form of extrapolation, many assumptions, and often unreliable or incomplete data. The table below gives a summary of the mean and spread of average ecosystem service values for the four broad categories of ecosystems based on the existing literature calculated from the best quality references (i.e. "useable references").

Summary of average ecosystem services values (US$/ha/year)

	Mean value	Maximum value	Minimum value	# Useable references
Forests	1,281			
Local use of non-timber products	26	165	2	16
Sustainable timber	104	171	37	2
Watershed protection	183	399	3	9
Carbon sequestration	968	2,085	34	6
Freshwater wetlands	1,634			
Local use of aquatic products	198	658	4	4
Water quality and flow services	1,436	1,436	1,436	1
Mangroves	2,670*			
Local use of aquatic products	282	1,200	4	8
Coastal protection	2,243	3,679	50	3
Tourism and recreation	3,000	3,000	3,000	1
Carbon sequestration	100	100	100	1
Support to offshore fisheries	45	45	45	1
Coral reefs	326*			
Tourism	207	332	82	2
On-site fisheries	155	155	155	1
Coastal protection+	171	500	5	3

* Excludes tourism and recreation. These values are highly location-specific, and the sites at which such data has been generated are for the most part already developed and well served by transport and other infrastructure. It cannot be assumed that all sites in the region have this potential, or are ever likely to.

\+ Uses data from Indonesia.

The estimates used in this analysis are not comprehensive, and contain many gaps – for key ecosystem services or sites, estimates of economic value simply do not exist. An example of this is the economic value ascribed to coral reefs in the table above – it would be absurd to conclude that coral reefs are somehow worth "less" than the other ecosystems presented in the table. Rather, a lack of data makes it difficult to reflect the full economic value of coral reef ecosystem services in the figures that are presented in this report.

Our figures present a first attempt to generate indicative and rough estimates which will give some idea of the broad magnitude of the value of the services provided by different ecosystems in the Lower Mekong region. As better and more accurate information becomes available, these figures can be updated and improved. We hope to carry out a more detailed and better-informed exercise via a future project.

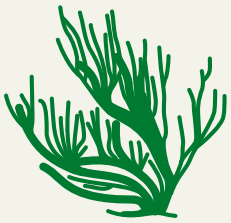
Some points to note before looking at the study results:

- Most ecosystem valuation estimates have a very weak scientific basis, and the assumptions they make about the links between ecosystem status and the provision of given ecosystem services are largely unsourced. The scientific and biophysical data required for both ecosystem valuation and scenario modelling needs to be identified, extracted and made available in a form that can be integrated into economic modelling and datasets.
- A major gap also exists in terms of linking ecosystem and economic scenario modelling to a thorough analysis of the drivers of ecosystem change in the region.
- A credible scenario modelling exercise and associated economic analysis demands a broad-based dialogue with key stakeholders and experts in the region. This study needs to be considered as a starting point for that dialogue – not a final set of results.
- We give no specific recommendations on individual ecosystem valuation techniques, as each is suitable for different situations and it is generally considered best practice to deploy as broad a range of techniques as possible. The one caveat to this concerns the use of benefit-transfer techniques: applying figures generated in other parts of the world is not recommended for use in any further ecosystem valuation work in the Lower Mekong region.

Sampans meet at early morning market in the Mekong Delta where rivers converge.

PROJECTIONS FOR BUSINESS AS USUAL VS. GREEN ECONOMIC GROWTH

In our study, we set a baseline for the physical coverage of forest, freshwater, mangroves and coral reefs in 2010 – and then describe scenarios for the change in that coverage with the implications for the change in value of services being delivered by those ecosystems by 2035.



Because the analysis of the region's ecosystems does not include each and every ecosystem service and their values – for which the data is limited in any case – the baseline estimate for the current contribution of ecosystem services generated in this study must be considered as only an approximate figure. As a result, and in line with best practice for economic valuation of ecosystem services, the focus of this study is more correctly on the marginal value of change under different scenarios of ecosystem management regimes over a 25-year time frame. This approach gives us a net value added – or net cost avoided – that can be ascribed to different future policy scenarios until 2035.

We compared two future scenarios to look at the potential costs and benefits of conserving natural ecosystems: Business As Usual (BAU) and Green Economic Growth (GEG). Each scenario presents a (very simplified and generalized) model of how the use of land and resources, and the area and quality of ecosystems, might change over the next 25 years in the Lower Mekong countries of Cambodia, Laos, Thailand and Vietnam.

BAU: The "Business As Usual" scenario depicts what will happen if current trends of ecosystem loss continue. A dominant development paradigm which emphasizes short-term economic gains at the expense of longer-term sustainable development will prevail. Even though policies supporting the conservation and sustainable use of ecosystems will remain in force, they will not always be implemented or enforced effectively. In practical terms, this means the area of well-managed natural ecosystems will be progressively degraded, converted and lost.

Nypa channel, Mekong Delta, Vietnam.

As population increases in the region, there will be a rising demand for food, timber and other products, many of which will be sourced unsustainably. Stocks of biological resources will become exhausted in certain places, and some species may become locally extinct. Resource demands will also be driven by the growth of an increasingly affluent urban population, but a large proportion of the region's rural population will continue to rely on wild products and species for their day-to-day livelihoods and survival.

Under the BAU scenario, farming and land-based production systems will be intensified, and there will continue to be wide-scale conversion of natural habitats to agriculture, industrial plantations and urban settlements. Roads, hydropower and extractive industries will leave their mark on many pristine landscapes. Climate change will compound these impacts, as human and natural systems become more vulnerable to stresses and shocks.

Table 1: Annual regional ecosystem services values by 2035 under BAU (Net Present Value, US$ billion)

	BAU
Natural forests	64.19
Freshwater wetlands	45.82
Mangroves	1.10
Coral reefs	0.63
Total	**111.74**

Table 2: Annual regional ecosystem services values by 2035 under GEG (Net Present Value, US$ billion)

	GEG
Natural forests	69.87
Freshwater wetlands	50.41
Mangroves	1.19
Coral reefs	0.71
Total	**122.19**

Table 3: Annual value-added of regional ecosystem services from GEG over BAU (Net Present Value, US$ billion)

	BAU	GEG	Value added
Natural forests	64.19	69.87	5.68
Freshwater wetlands	45.82	50.41	4.59
Mangroves	1.10	1.19	0.10
Coral reefs	0.63	0.71	0.08
Total	**111.74**	**122.19**	**10.45**

GEG: The "Green Economic Growth" scenario depicts what will happen if the region's protected area system is expanded and strengthened, and renewed efforts are made to better fund and conserve ecosystems and biodiversity outside protected areas. GEG attempts to stimulate public and private involvement in the sustainable use of biodiversity and ecosystems, so as to capture ecosystem values both as real economic and livelihood gains, and as financing for conservation. Rates of ecosystem loss will decline, and key landscapes will be rehabilitated and restored.

National development policy will continue to be focused firmly on economic growth and poverty reduction. But a more proactive and progressive on-the-ground approach to ecosystem conservation will be reflected in greater success in mainstreaming conservation goals within other sectors. New conservation management and funding approaches will be backed up by new policies and instruments that will go some way towards balancing the market and price distortions that have long acted as disincentives to sustainable ecosystem management.

Urbanization and market integration will increase, and there will be an upsurge in industrial and commercial activities across the region. Development will not be achieved without some impact on biodiversity and ecosystems. But the focus on more environmentally sustainable development, combined with more effective enforcement of environmental laws, will mitigate many of the negative effects. Investments will be made in promoting cleaner production, alternative energy sources, greener technologies and sustainable sourcing of products. Meanwhile, both the corporate sector and civil society will become more involved in sustainable use activities, and better able to benefit from the economic opportunities they afford. Human and natural systems will be more resilient to climate change.

Value added from GEG

THESE VALUES CAN ALSO BE THOUGHT OF AS THE COSTS OF POLICY INACTION OVER THE NEXT 25 YEARS

The scenario analysis makes it clear that there are considerable gains to the region from GEG over and above a continuation of BAU. At the regional level, the net present value added from pursuing such a strategy is estimated at almost US$10.5 billion. As ecosystems are maintained and improved, all ecosystem services increase in value over the 25-year period modelled. Regulating and supporting services contribute by far the greatest proportion – around three-quarters – of this value.

As described (in Table 3), the value added from GEG over and above that which would be generated under BAU is estimated at almost US$10.5 billion. The value added by GEG will steadily increase over time. By 2035 (the end of the time period analysed), GEG will be generating an annual value added of more than US$4.6 billion as compared to the benefits that would have been gained under BAU. Cumulatively, almost US$55 billion value will have been added to the region's economy by GEG over and above BAU. These values can also be thought of as the costs of policy inaction over the next 25 years: the losses that will accrue as a consequence of failing to take steps to reverse the current trends of ecosystem degradation and underinvestment.

Mekong fishermen, Cambodia (Kampuchea).

Rice paddy terraces close to the Chinese border, northern Vietnam.

KEY INTERVENTIONS NEEDED TO ACHIEVE THE GREEN ECONOMY SCENARIO

The fundamental challenge is to tackle the discrepancy between unsustainable short-term economic gains and returns on investments through establishing incentives that make sustainable investments competitive.

Economic decision making at all levels of society drives land and resource use. Yet policy and legal frameworks in the region still for the most part present an unsupportive environment for producers, consumers and investors to factor biodiversity and ecosystem services into their economic decisions. Large-scale subsidies still exist in the agricultural, fisheries, energy, industrial and water sectors, which encourage the over-exploitation and destructive use of land and resources. At the same time, products and markets which are based on the conservation and sustainable use of biodiversity and ecosystems tend not to be subject to this type of preferential treatment, being accorded a lower economic policy priority, facing relatively less spending on research and development, higher tax rates, and greater difficulties in accessing credit and investment funds.

LARGE-SCALE SUBSIDIES STILL EXIST IN THE AGRICULTURAL, FISHERIES, ENERGY, INDUSTRIAL AND WATER SECTORS, WHICH ENCOURAGE THE OVER-EXPLOITATION AND DESTRUCTIVE USE OF LAND AND RESOURCES

The bottom line is that, for many sectors, businesses and households in GMS countries, it remains less profitable or more expensive to act in an environmentally sustainable manner. As a result most are unwilling – and many are unable to afford – to do so. Realizing green economic growth in the Mekong region will require new national and regional development paradigms that promote:

- Natural capital being recognized and protected as a foundation of sustainable economic development
- Efforts to generate new primary data on the key values, particularly supporting and provisioning services, for representative ecosystems in the region
- Improved and more efficient management of the region's interconnected ecological systems with incentives to invest in building, restoring and protecting the region's natural capital and ecological productivity
- Sustainable infrastructure for transport, energy, agricultural production, and industrial development as part of a broad system of integrated land use planning
- Energy and resource efficiency measures
- Transparency, sustainable production and decent job creation, including integrating low-carbon, clean technology across a range of sectors
- Sustainable consumption and public procurement
- Sustainable financing/incentivizing transition to green economies
- Investment in training and education for green jobs (i.e. development of human capital for green economies)
- Equitable development across regions and countries

The interventions postulated in the GEG scenario are based on land use and ecosystem area coverage and quality, specifically:

1. Maintaining the absolute size of the region's protected area system, though allowing for some re-zoning or re-categorization, i.e. 0.0 per cent loss.
2. Managing protected areas more effectively, including re-zoning or re-categorization to reduce threats from uncontrolled urbanization, extractive industries, and encouraging uptake of cleaner production technologies, alternative energy and sustainable sourcing of products that will ultimately contribute to healthier, more robust ecosystems.
3. Mainstreaming conservation goals into the strategies, policies and plans of other economic sectors and other policy implementation such that loss in ecosystem land cover is reduced, totalling approximately the following additional hectares above and beyond the BAU scenario over the 25 year time frame:

- **Natural forests** 4.4 million ha
- **Freshwater wetlands** 2.8 million ha
- **Mangroves** 37,500 ha
- **Coral reefs** 24,500 ha

4. Increasing funding (public and other) to maintain protected areas.
5. Increasing civil society and private sector engagement in the funding and management of protected areas.

Rattan products made by local villagers supplied to local market at Kampot province, Cambodia.

WWF RECOMMENDATIONS FOR ACTION

In conclusion, natural capital valuation is an excellent tool for decision makers in green growth planning but the dots must be joined between ecosystem service "problems", real decision-making processes and valuation approaches in the Lower Mekong countries.

Information on the economic value of ecosystem services has little relevance if it is not being communicated effectively to decision-makers, in a form that is practical, relevant and credible to them.

Sectors must work in a paradigm of partnership and equality, jointly determining what is success and the measurements for progress towards societal goals in the context making the choice between setting a business as usual or a green economic growth pathway.

As such, WWF makes three recommendations for government, private sector and civil society actors:

1. Investment is required in generating more information on the economic value of ecosystem services in order to implement effectively the national green growth strategies and policies under development in the Lower Mekong countries.
2. The work begun in this study should be continued through a broader dialogue with key stakeholders and experts in the region. Only through this wider consultation and input can realistic scenarios of future development, conservation and ecosystem trends be described.
3. Policy-makers must demand the information, and practitioners must be open to engaging in a dialogue with end users of valuation data in order to design and produce valuation studies at the scale of decision-making and in the context of particular policy issues.

US$4.59 billion could be added to the economies of the Greater Mekong region through the maintenance of freshwater wetlands alone.

Greater Mekong green economy

100% RECYCLED

US$4 BILLION

Retail value of Mekong River fisheries estimated at more than US$4 billion annually

60 MILLION

The Lower Mekong River provides the main source of food for 60 million people

US$55 BILLION

The value that could be added cumulatively to the combined economies of Cambodia, Laos, Thailand and Vietnam by 2035 through implementing green economic growth policies that maintain natural capital over and above the value added by 'Business as Usual' economic development

80%

The Greater Mekong's natural capital directly supports 80 per cent of the region's population by providing vital ecosystem services

WWF

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.

panda.org

The Greater Mekong region is one of the biologically richest places on the planet; its varied natural resources support the livelihoods and well-being of millions of people in mainland Southeast Asia. WWF-Greater Mekong – on the ground in Cambodia, Laos, Myanmar, Thailand and Vietnam – is working to conserve the region's biodiversity and build a secure and sustainable future for people and wildlife.

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