



**Latin America and the Caribbean research to
inform the High Level panel on Global
assessment of resources for implementing the
Strategic plan for Biodiversity 2011-2020**

El Resumen Ejecutivo existe en inglés y español

Latin America and the Caribbean research to inform the High Level panel on Global assessment of resources for implementing the Strategic plan for Biodiversity 2011-2020

UNEP-WCMC

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Executive Summary

Introduction

The Latin America and the Caribbean region is extremely rich in its biological resources and ecosystems, as well as in its diversity of cultures and economic and social conditions. The region's ecosystems provide a wide range of valuable services, which are vital for people, the economy and the region's development. Meeting the Aichi targets will help to secure the delivery of these services, but requires substantial challenges to be overcome. This report presents the findings of a review of the benefits and costs of meeting the Aichi Targets in the region. It draws on a wide range of local, national and regional studies, publications of international and UN organisations, and relevant databases.

Benefits

- The evidence demonstrates the substantial value of the range of services delivered by the region's ecosystems, which help to maintain production of food and fibre, deliver vital regulating services at the global and local level, support tourism and recreation and deliver other unmarketed cultural services.
- A range of qualitative, quantitative and monetary assessments of benefits were found, for different ecosystems and at different spatial scales.
- However, the evidence is somewhat fragmented. Few estimates are available at country or regional level, and it is necessary to piece together evidence from a range of sources in order to understand the benefits of meeting the Targets across the region.
- The strongest evidence is available for particular Targets, especially those relating to the conservation and restoration of forests, wetlands, mangroves and coral reefs.
- There is strong evidence of the immense value of the services provided by the region's forests, especially through their role in regulating the global climate. Aichi Targets 5, 7, 11, 14 and 15 have an important role to play in maintaining these benefits.
- There is evidence of the need for urgent action to improve the sustainability of the region's fisheries, and the substantial benefits of delivering Aichi target 6.
- The benefits of biodiversity conservation are strongest for low-income local communities due to their dependence on ecosystem services.
- Ecosystem services offer multiple benefits to a range of different stakeholders, and increasing recognition of the value of these services is providing new potential sources of revenues to invest in biodiversity conservation, including through private sector participation in PES schemes.

Investment needs

- A recent regional workshop reviewing progress towards the Aichi targets in the LAC region provides some useful insights into overall investment needs. This found that countries have made strong progress in the achievement of some Targets (e.g. 11 – protected areas; 12 – species conservation) 17 – NBSAPs, 18 – traditional knowledge and 19 – science and technology).
- Countries have indicated a low level of achievement for targets 3 (incentives), 6 (sustainable fisheries), 9 (invasive species), 10 (preservation of coral reefs), 13 (genetic diversity), and 14 and 15 (ecosystem restoration). This suggests that greatest efforts need to be devoted to these areas. This has implications for investment needs, but low levels of progress also reflect other challenges such as political barriers.
- The evidence reviewed indicates that a priority in many countries is to create the enabling conditions and institutional frameworks to achieve the Aichi targets. These include development of appropriate governance and legal frameworks, incentive mechanisms, capacity and knowledge on which biodiversity action depends.

- Priorities differ across the sub-regions. In the Caribbean region, a high priority relates to the conservation of marine and coastal environments.
- In Central America and South America, a key priority is to develop sustainable financing mechanism to respond to multiple objectives (protected areas and sustainable agriculture, afforestation, reforestation and forest restoration).
- The Aichi targets are interrelated and effective implementation will depend on timing and sequencing of actions to achieve optimal effect. In particular, investments in capacity building and appropriate institutional and policy frameworks will be important in delivering Aichi Targets 1-4 and 17-20 and in creating the conditions needed to deliver all other targets.

Resource needs

- In order to assess resource needs, we have analysed the current financing allocations in the region, sources of funding and available evidence of the resources needed to achieve the Aichi targets.
- We only find evidence available on actions related to protected areas or areas which need to be covered to protect species and key ecosystems. These actions are related to Aichi targets 11(protected areas), 12(species conservation), 10 (preservation of coral reefs) and 3 (incentive measures).
- The total annual conservation expenditures in the Latin American & the Caribbean region have been estimated to amount to an average of US\$632 million per year (2001-2008), from which US\$ 203 million were allocated to Central America, US\$ 395 million allocated to South America and approximately US\$ 33 million to the Caribbean countries.
- Most funding for biodiversity in Central America comes from international donors and bilateral cooperation. However, domestic resources account for the majority of funding in South America and the Caribbean.
- The total current funding for protected areas was estimated to amount to approximately to US\$239million per year in South America, US\$141 million per year in Central America and \$54 million per year in the Caribbean.
- There are significant funding gaps. For protected areas alone, it is estimated that funding will need to increase by 2 to 3.2 times on current levels in South America to meet identified needs, and by 1.5 to 2.3 times in Central America.
- Since countries in the region estimate that their progress towards Aichi Target 11 (protected areas) is ahead of that for other targets, the funding gap for other Targets may be greater than for Target 11.
- The resource needs have to be considered above the current financial allocations. The current allocations have not halted the continuous degradation of biodiversity in protected areas which makes necessary additional resources to reach optimal management.
- Resource requirements increase significantly if other activities, where progress has so far been limited, are considered (e.g. restoration of key ecosystems – Aichi Targets 14 and 15).
- The main sources of financial resources are government spending, international cooperation and fees from users. In some countries, the level of national investment is too low compared to other sources of funding. International funding can be more effective in those areas where the enabling conditions allow for progress in conservation activities, or where funds can be directed to areas that create those institutional frameworks.
- Though detailed quantitative evidence is limited, the findings largely support those of the High Level Panel's report to COP11.

Policy Alignment and Development

- There is a strong connection between environmental degradation and the social economic conditions facing local populations.
- Providing secure and safe environmental conditions, and maintaining the delivery of key ecosystem services, contributes to the people's livelihoods and to development outcomes.
- Most of biodiversity conservation challenges in the Region are strongly related to poverty alleviation.
- Examples are given of biodiversity conservation initiatives that jointly deliver the Aichi Targets and positive development outcomes.
- Synergies and overlaps with other policy agendas mean that mainstreaming of biodiversity objectives is important, and this has implications for awareness, governance, capacity and co-ordination of delivery.

Cost Effectiveness

- Regional examples demonstrate that maintaining ecosystems and their services can save costs compared to allowing them to decline;
- The way that the targets are delivered – and the sequencing of overall delivery – will have an important influence on their overall costs.

Costs and Benefits

- Little evidence was found that directly assessed the costs and benefits of achieving one or more Aichi targets. However, some studies provide evidence that the benefits of relevant investments in biodiversity and ecosystems can exceed the costs.
- The strongest evidence that the benefits of conservation exceed the costs relates to forest conservation, where studies have shown that the net benefits of conservation through REDD+ and other PES schemes widely exceed the opportunity costs, particularly through avoided CO2 emissions.
- Services delivered by the most important ecosystems in the region such as mangroves, tropical forests and wetlands are likely to amount to many hundreds of billions of dollars per year. The costs of securing these services have not been estimated at regional scale, but are likely to amount to tens of billions of dollars annually.
- This suggests that ecosystem conservation in the region is likely to deliver net benefits, and supports the conclusions of global studies examining the costs and benefits of conservation action.

Resumen Ejecutivo

Introducción

La región de Latinoamérica y el Caribe es muy rica en sus recursos biológicos y los ecosistemas, así como en su diversidad de culturas y de las condiciones económicas y sociales. Los ecosistemas de la región ofrecen una amplia gama de valiosos servicios, que son vitales para las personas, la economía y el desarrollo de la región. El cumplimiento de las metas de Aichi ayudará a asegurar la prestación de estos servicios, pero requiere de la atención de importantes retos que hay que superar. Este informe presenta los resultados de un estudio y análisis de los beneficios y costos de cumplir con las Metas de Aichi en la región. Se basa en una amplia gama de estudios locales, nacionales y regionales, publicaciones de organizaciones internacionales y de la ONU y bases de datos pertinentes.

Beneficios

- La evidencia demuestra que hay un valor sustancial de servicios ecosistémicos prestados en la región, que ayudan a mantener la producción de alimentos y fibras, la prestación de servicios vitales de regulación de aguas y clima a nivel global y local, apoyar el turismo y la recreación, y ofrecer otros servicios culturales no comerciables.
- Una serie de evaluaciones cualitativas, cuantitativas y monetarias de beneficios fueron encontrados, por los diferentes ecosistemas y en diferentes escalas espaciales.
- Sin embargo, la evidencia es fragmentada. Pocas estimaciones están disponibles a nivel nacional o regional, y es necesario reconstruir la evidencia de una serie de fuentes para entender los beneficios de cumplir con los objetivos de la región.
- La evidencia más fuerte está disponible para objetivos particulares, especialmente los relativos a la conservación y restauración de bosques, humedales, manglares y arrecifes de coral.
- Hay una fuerte evidencia de inmenso valor por los servicios proporcionados por los bosques de la región, especialmente a través de la regulación del clima mundial. Metas de Aichi 5, 7, 11, 14 y 15 tienen una función importante que desempeñar en el mantenimiento de estos beneficios.
- Hay evidencia sobre la necesidad de adoptar medidas urgentes para mejorar la sostenibilidad de las pesquerías de la región, y los beneficios sustanciales de la entrega de la Meta de Aichi 6.
- Los beneficios de la conservación de la biodiversidad son más fuertes para las comunidades locales y grupos indígenas bajos ingresos, debido a su dependencia de los servicios de los ecosistemas.
- Los servicios ecosistémicos ofrecen múltiples beneficios a una amplia gama de diferentes grupos de interés, y el aumento de reconocimiento del valor de estos servicios será derivando de nuevas fuentes potenciales de ingresos para invertir en la conservación de la biodiversidad, incluyendo la participación del sector privado en los esquemas de PSA.

Las necesidades de inversión

- En un reciente taller en la región de ALC sobre la revisión del progreso hacia las Metas de Aichi aportó algunas ideas útiles sobre las necesidades generales de inversión. Esto reveló que los países han hecho grandes progresos en la consecución de algunos objetivos (por ejemplo, 11 - áreas protegidas, 12 - la conservación de especies, 17 - EPANB, 18 - conocimientos tradicionales, y 19 - la ciencia y la tecnología).
- Los países han indicado un bajo nivel de logro para los objetivos 3 (incentivos), 6 (pesca sostenible), 9 (especies invasoras), 10 (conservación de los arrecifes de coral), 13 (diversidad genética), y 14 y 15 (la restauración de ecosistemas). Esto sugiere que los mayores esfuerzos deben dedicarse a estas áreas. Esto tiene implicaciones para las necesidades de inversión, pero los bajos niveles de progreso también refleja otros desafíos tales como las barreras políticas e institucionales.
- La evidencia examinada indica que una prioridad en muchos países es el de establecer las condiciones de habilitación y marcos institucionales para alcanzar las Metas de Aichi. Estos incluyen el desarrollo de la gobernanza adecuada y marcos legales, mecanismos de incentivos, la capacidad y el conocimiento en las que la acción de la biodiversidad depende.

- Las prioridades son diferentes en las subregiones. Por ejemplo en la región del Caribe, una alta prioridad se refiere a la conservación de los ambientes marinos y costeros.
- En América Central y América del Sur, una de las principales prioridades es el desarrollo de mecanismos de-financiamiento sostenible para responder a múltiples objetivos (áreas protegidas y la agricultura sostenible, la forestación, la reforestación y restauración de los bosques).
- Las Metas de Aichi están interrelacionadas, y la aplicación efectiva dependerá de tiempo y la secuencia de acciones para conseguir un efecto óptimo. En particular, las inversiones en la creación de capacidades y los marcos institucionales y de política apropiadas serán importantes en la entrega de Metas de Aichi 1-4 y 17-20, y en la creación de las condiciones necesarias para ofrecer todos las demás metas.

Las necesidades de recursos

- A fin de evaluar las necesidades de recursos, se han analizado las asignaciones actuales de financiamiento de la región, las fuentes de financiación y la evidencia disponible de los recursos necesarios para alcanzar las Metas de Aichi.
- Sólo encontramos evidencia disponible sobre las acciones relacionadas con las áreas protegidas o áreas que necesitan ser cubiertas para proteger las especies y los ecosistemas claves. Estas acciones están relacionadas con las Metas de Aichi 11 (áreas protegidas), 12 (conservación de las especies), 10 (conservación de los arrecifes de coral) y 3 (los incentivos).
- El total de los gastos en conservación anuales en la región de América Latina y el Caribe se han estimado ascendería a un promedio de \$ 632 millones por año (2001-2008), de la que \$ 203 millones fueron asignados a Centroamérica, \$ 395 millones asignado a América del Sur y aproximadamente \$ 33 millones para los países del Caribe.
- La mayoría de los fondos para la biodiversidad en América Central proviene de donantes internacionales y la cooperación bilateral. Sin embargo, los recursos nacionales representan la mayor parte de la financiación en América del Sur y el Caribe.
- La financiación total actual de las áreas protegidas se estimó que ascenderá aproximadamente a \$ 239 millón por año en América del Sur, \$ 141 millones por año en América Central y 54 millones de dólares al año en el Caribe.
- Existen brechas de financiamiento significativas. Para las áreas protegidas solamente, se estima que la financiación tendrá que aumentar de 2 a 3,2 veces en los niveles actuales de América del Sur para satisfacer las necesidades identificadas, y en 1,5 a 2,3 veces en Centroamérica.
- Dado que los países en la región estiman que su progreso hacia la Meta de Aichi 11 (áreas protegidas) está por delante de la de otros objetivos, el déficit de financiación para otros objetivos puede ser mayor que el de la Meta 11.
- Las necesidades de recursos tienen que ser considerados por encima de las asignaciones financieras actuales. Las asignaciones actuales no han detenido la continua degradación de la biodiversidad en las áreas protegidas que significa que los recursos adicionales necesarios para alcanzar una gestión óptima.
- Las necesidades de recursos aumentan significativamente si otras actividades, donde el progreso hasta ahora ha sido limitada, se considera (por ejemplo la restauración de los ecosistemas clave - Metas de Aichi 14 y 15).
- Las principales fuentes de recursos financieros son el gasto público, la cooperación internacional y las cuotas de los usuarios. En algunos países, el nivel de inversión nacional es muy baja en comparación con otras fuentes de investigación. El financiamiento internacional puede ser más eficaz en aquellas zonas donde las condiciones favorables permiten avances en las actividades de conservación, o donde los fondos pueden destinarse a sectores que crean los marcos institucionales.
- A pesar de que la evidencia cuantitativa detallada es limitado, los resultados apoyan en gran medida a los del informe del Grupo de Alto Nivel de la COP11.

Alineación y Desarrollo de Políticas

- Hay una fuerte conexión entre la degradación ambiental y las condiciones económicas y sociales que enfrentan las poblaciones locales.
- La provisión de condiciones ambientales seguras y el mantenimiento de la prestación de los servicios ecosistémicos claves, contribuye fuertemente a los medios de vida de las personas y los de desarrollo.

- La mayoría de desafíos por la conservación de biodiversidad en la región están estrechamente relacionadas con la mitigación de la pobreza.
- Se dan ejemplos de iniciativas de conservación de la biodiversidad que ofrecen conjuntamente las Metas de Aichi y los resultados positivos de desarrollo.
- Las sinergias y complementos con otros programas de políticas significa que la integración de los objetivos de biodiversidad son importantes, y esto tiene implicaciones para la conciencia, la gobernanza, la capacidad y la coordinación de la entrega.

Rentabilidad

- Ejemplos regionales demuestran que el mantenimiento de los ecosistemas y sus servicios puede ahorrar los costos en comparación con lo que les disminuyan.
- La forma en que los objetivos se entregan - y la secuencia de ejecución sobre todo - tendrá una influencia importante en sus costos totales.

Costos y beneficios

- Se encontró poca evidencia que evalúa directamente los costos y beneficios de lograr una o más Metas de Aichi. Sin embargo, algunos estudios demuestran que los beneficios de las inversiones pertinentes en biodiversidad y los ecosistemas pueden superar los costos.
- La evidencia más fuerte de que los beneficios de la conservación superan a los costos se refiere a la conservación de bosques, donde los estudios han demostrado que los beneficios netos de la conservación a través de REDD+ y esquemas de PSA superan ampliamente los costos de oportunidad, sobre todo a través de las emisiones de CO₂ evitadas.
- Los servicios prestados por los ecosistemas más importantes de la región, como manglares, bosques tropicales y humedales suelen equivaler a muchos cientos de miles de millones de dólares por año. Los costos de asegurar que estos servicios no se han estimado a escala regional, pero es probable que ascendían a decenas de miles de millones de dólares anualmente.
- Esto sugiere que la conservación de ecosistemas en la región brinde beneficios netos, y apoye las conclusiones de los estudios mundiales que examinan los costos y beneficios de las acciones de conservación.

1 Introduction

This report presents evidence on the costs and benefits associated with the implementation of the Aichi targets in Latin America and the Caribbean. It presents the evidence found at the regional, national and local level, in response to the six main questions set by the High Level Panel on Global assessment of resources for implementing the Strategic plan for Biodiversity 2011-2020.

The Latin America and the Caribbean region is extremely rich in its biological resources and ecosystems, as well as in its diversity of cultures and economic and social conditions.

The region comprises 50 countries divided into three sub-regions following those of the UN Statistics Division, as listed below:

- The Caribbean: Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Bonaire, Saint Eustatius and Saba, British Virgin Islands, Cayman Islands, Cuba, Curaçao, Dominica, Dominican Republic, Grenada, Guadeloupe, Haiti, Jamaica, Martinique, Montserrat, Puerto Rico, Saint-Barthelemy, Saint Kitts and Nevis, Saint Lucia, Saint Martin (French part), Saint Vincent and the Grenadines, Sint Maarten (Dutch part), Trinidad and Tobago, Turks and Caicos Islands and United States Virgin Islands.
- Central America: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama.
- South America: Argentina, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Ecuador, Falkland Islands (Malvinas), French Guiana, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela (Bolivarian Republic of).

Each section presents a review of evidence across the region and illustrates this with case studies.

2 Methodology

2.1 Research methods and sources of evidence

This research has involved:

- An extensive web and literature review;
- An extensive search of international databases, especially EVRI;
- An analysis of resource requirements, using the data base used by Waldron et al. (2013)¹ available at www.pnas.org/lookup/suppl/doi:10.1073/pnas.1221370110/-/DCSupplemental.
- Contact with key experts, in order to signpost relevant evidence and collate case study information.
- The Environmental Valuation Reference Inventory™ (EVRI™) provided a useful source of evidence, particularly on benefits and their value. This database is intended primarily as a tool to assist policy analysts using the benefits transfer approach to estimate economic values for changes in environmental goods and services or human health. The database provided around 60 articles specifically targeting Latin America and the Caribbean. The most representative articles were selected for further analysis and served as basis for the identification of other articles.
- Another source of information was the Latin America Environmental Economics programme (LACEEP) network where some articles were used to illustrate some of the case studies.
- Publications of UNDP, FAO and TNC also served as key reference sources.

2.2 Overview of availability and robustness, methodological issues, evidence gaps, variations in extent and quality of evidence between questions

Most of the evidence found does not directly refer to the Aichi targets, but relates to biodiversity conservation initiatives more generally. Nevertheless, many studies provide relevant evidence on many of the actions relevant to the delivery of the Targets. It has therefore been necessary to link the evidence found as far as possible to the relevant Targets. This is straightforward for some Targets (e.g. Targets 9 - invasive species, 11 – protected areas, 13 - genetic resources and 16 - Nagoya protocol) which are addressed by specific policies. Other Targets present greater challenges, because of synergies and overlaps between Targets and the actions required to meet them.

The extent and quality of the available evidence varied between the research questions. Generally, while much evidence was found on the benefits of meeting the Targets and the investments required, there was less evidence on cost-effectiveness and the relative value of costs and benefits. Some evidence was found on financial needs and resource requirements, and, although there are significant uncertainties, this was generally found to provide a reasonable basis for the analysis.

¹ Waldron A., A.O. Mooers, D.C. Miller, N. Nibbelink, D. Redding, T.S.Kuhn, J.T.Roberts, J.L. Gittleman. 2012. Targeting global conservation funding to limit immediate biodiversity declines. Available at: <http://www.pnas.org/cgi/doi/10.1073/pnas>.

3 Benefits to delivering the Aichi targets

3.1 Key messages on benefits

- The evidence demonstrates the substantial value of the range of services delivered by the regions ecosystems, which help to maintain production of food and fibre, deliver vital regulating services at the global and local level, support tourism and recreation and deliver other unmarketed cultural services.
- A range of qualitative, quantitative and monetary assessments of benefits were found, for different ecosystems and at different spatial scales.
- However, the evidence is somewhat fragmented. Few estimates are available at country or regional level, and it is necessary to piece together evidence from a range of sources in order to understand the benefits of meeting the Targets across the region.
- The strongest evidence is available for particular Targets, especially those relating to the conservation and restoration of forests, wetlands, mangroves and coral reefs.
- There is strong evidence of the immense value of the services provided by the region's forests, especially through their role in regulating the global climate. Aichi Targets 5, 7, 11, 14 and 15 have an important role to play in maintaining these benefits.
- There is evidence of the need for urgent action to improve the sustainability of the region's fisheries, and the substantial benefits of delivering Aichi target 6.
- The benefits of biodiversity conservation are strongest for low-income local communities due to their dependence on ecosystem services.
- Ecosystem services offer multiple benefits to a range of different stakeholders, and increasing recognition of the value of these services is providing new potential sources of revenues to invest in biodiversity conservation, including through private sector participation in PES schemes.

3.2 What will be the economic benefits of delivering the Aichi targets?

The Latin America and the Caribbean region is extremely rich in its biological resources and ecosystems, as well as in its diversity of cultures and economic and social conditions. The region's ecosystems provide a wide range of valuable services, which are vital for people and the economy. The region also faces huge environmental challenges, which must be addressed if the Targets are to be met. Because of the strong links between biological conservation and poverty alleviation, delivering the Aichi Targets will play a key role in the region's development.

There exist no overall estimates of the total value of the benefits associated with biodiversity conservation in Latin America and the Caribbean. Many studies have attempted to evaluate these benefits and assess the value of ecosystem services, although most only consider a limited number of ecosystem services within a limited geographical area. In this section we focus on different studies analysing the economic value of different types of forests and the main ecosystem services related to carbon sequestration and water services. We provide evidence by sub-regions (South America, Central America and the Caribbean) and by type of ecosystems (forests, coral reefs and wetlands).

3.2.1 Benefits of Forest Conservation (Aichi Targets 5, 7, 11, 14 and 15)

Forest ecosystems are at the heart of most of the ecosystem services and the Latin America and Caribbean region is home the world's largest rainforest. About 40% of the world's remaining tropical rainforest is located in the Amazon. Neo-tropical rainforests are believed to be the most species-rich in existence. Forests deliver provisioning services (timber extraction and use of non-timber products), regulating services (climate regulation, hydrological services, nutrient retention, carbon sequestration, pollination and biological control) and cultural services (tourism, recreation). These are underpinned by supporting services such as habitat for flora and fauna, soil protection and conservation of water

resources. Due to the diversity of types of forest, ecological services vary according to geographical scale, topography, and surrounding landscapes and land uses. Addressing the pressures caused by land based production practices requires the integration of sustainable management practices in agriculture, forestry and livestock production systems.

Forest preservation and water resources are strongly linked and there is a strong evidence of the positive effects of the former may on the latter. Forest conservation has positive effects on the quantity and quality of water resources. Whilst there is some evidence of the links between the quality of water and forest in good condition, there is less scientific certainty on the benefits of forest conservation for water supply, except for specific type of forests such as cloud mountain forests, due to their capacity to capture humidity in fog, and dry tropical forest which reduce the risk of floods under certain geological and hydrological conditions (Munoz-Piña et al. 2008).

Paramos ecosystems also provide regulation services of water resources. Changes in use of forest land for productive purposes are driving forces affecting forest condition and water ecosystems and their services. Deforestation is also explained by illegal logging and by the continuous degradation of soils and soil nutrients which lead to further clearing of forests. Due to the strong dependence for income generation in the use of forest resources and land, conservation of forest and aquatic ecosystems represents high opportunity costs for local communities that need to be compensated to make conservation effective. The weakness or the absence of clearly defined property rights of forest land contributes to deforestation and conflicts relating to access to natural resources. Recognising the value of environmental services, and designing mechanisms to pay for them, can help to address potential conflicts between poverty alleviation and environmental conservation, between local interests and global concerns and between present needs and those of future generations.

Carbon sequestration by forests

One of the key benefits derives from the carbon sequestered by existing forests and the carbon sequestration potential associated with afforestation and reforestation projects. REDD+ offers an opportunity to capture the potential benefits of these schemes that are of interest for global users.

Benites (2006) developed a grid-based approach to determine the net benefits of carbon sequestration through afforestation and reforestation projects in eight countries representing more than 90% of the Latin American region. Based on individual geographic entities (50km x 50 km cells), the study identified the carbon sequestration costs for the different cells categories. This integrated the costs categories such as opportunity costs of agricultural activities and of timber activities. A price index was used to correct land prices and plantation costs in the different countries. Under reasonable assumptions regarding the land and timber price and based on a real interest rate of 5% and a carbon price of \$US 20, the cumulative carbon sequestration for 2000-2012 and 2000-2020 was estimated at 125 million tonnes of Carbon (MtC) and 337 MtC respectively. This represents a net benefits of \$US 1.1 billion (\$US - 2000) for the period 2000-2012 and \$US 2.3 billion (\$US - 2000) for 2000-2020, covering only 4% of the area suitable for afforestation and reforestation in the region.

Before the final set-up of REDD+, different studies attempted to evaluate the potential benefits associated with the implementation of these schemes for the Latin American Region. It was for example estimated that a 10% reduction in annual deforestation rates from these scheme would generate carbon savings worth more than \$US 600 million annually, with a carbon price of €US5/tonne, and up to \$US 2.5 billion at a carbon price of \$US 30/tonne. Other estimates of the scale of REDD+ financing vary from \$US 2 billion to \$US 33 billion/year. For Ecuador, the potential yearly income is estimated in \$36 million, for Brazil \$208 million, Venezuela \$35 million, and for Bolivia, Peru, and Mexico just under \$20 million each (Bovarnick et al. 2010).

Benefits of Forest Conservation in Guatemala

Guatemala contains 14 ecological regions, including montane ecoregions that are considered a high conservation priority at the regional level; the rainforest of the Sierra Madre, also a high priority; and Central American mixed forests, which are considered vulnerable to threats and categorized as a moderate conservation priority. Guatemala has faced increasing deforestation during the last two decades: between 1991 and 2001, the country lost 73,148 ha of forest annually equivalent to a rate of -1.43% per annum. The root causes of this deforestation trend were agricultural expansion and the unsustainable use of forests. In addition Guatemala faces desertification and droughts and is highly vulnerable to variations in climate.

South-eastern Guatemala is characterized by the presence of dry forests, which are considered one of the most threatened ecosystems in Guatemala and in Central America. The benefits of restoration of 3,500 ha are estimated to amount to savings of 95,544 tCO₂e over 5 years. Forest conservation of 1,960 ha will bring avoided emissions of 413,114 tCO₂e and additional revenues through reduction of emissions under REDD+ equivalent to US\$619,672. Sustainable agroforestry systems covering 3,500 ha will contribute savings of 20,127 tCO₂e.

Western Guatemala is characterised by a humid mountain landscape and is home to important extensions of Central American pine oak forests, which are considered to be the richest in diversity of coniferous trees at the subtropical level and with high levels of regional and local endemism. The humid montane conservation will bring avoided emissions 468,360 tCO₂e representing revenues from REDD+ equivalent to US\$ 702,540. The establishment of a biological corridor of 13,843 ha would yield emissions savings of 30,130 tCO₂e.

(Source: GEF project "Sustainable forest management and multiple global environmental benefits")

In Costa Rica, the development of 21,000 plantations has sequestered a cumulative total of 1 million tonnes of carbon. The payment for environmental services (PSA) sought to sell carbon emissions reduction credits. FONAFIFO developed the certificate of tradable offsets which represent an externally certified 1-tonne net reduction in carbon emissions. The first impetus was given by the payment of US\$2 million for 200,000 CTOs from the Norwegian Government and a consortium of Norwegian power producers. Costa Rica obtained a contract through the World Bank's BioCarbon Fund that enables the country to sell about 0.61 million tonnes of carbon dioxide equivalent by 2017 for activities related to planting trees in agroforestry systems, natural regeneration and commercial plantations (Pagiola 2008).

Temperate forest in Chile with multiple ecosystem services

Nahuelhual et al. (2007)² estimated the economic benefits delivered by temperate forests in Chile. These include: production of timber, provision of nature-based recreation opportunities, maintenance of soil fertility, and water supply for human consumption. Based on secondary sources, the study first evaluated the benefits associated with different models of forestry exploitation (i.e., unsustainable harvesting – UH – and sustainable forest management – SFM) for different types of forest (secondary forest and old growth forest). The results showed that for secondary forests, SFM delivers higher benefits under all the scenarios considered. For old growth forest, UH produce larger benefits than SFM. However, if we also take water supply into account then SFM is more profitable than UH. Hence, as long as sustainable timber extraction is complementary with the provision of fresh water, SFM and forest conservation should be superior economic options for forest owners and managers than unsustainable extraction practices.

Table 3.1 Overview of annual benefits associated with different ES

Ecosystem services	Annual benefits (\$US - 2004)
SFM secondary growth forest	302/ha*
UH secondary growth forest	250/ha*

² Nahuelhual, L., et al. 2007. Valuing ecosystem services of Chilean temperate rainforests.

http://www.cepal.org/ilpes/noticias/paginas/4/31914/Nahuelhual_07_Eco_Services_Chilean_forests_GOOD.pdf

Ecosystem services	Annual benefits (\$US - 2004)
SFM old growth forest	367/ha*
UH old growth forest	462/ha*
Recreational service	1.6/ha to 6.3/ha
Maintaining soil fertility	26.3/ha
Water supply	235/ha
Notes:	
* Net Present Stumpage value: Values calculated based on a 8% discount rate for a 60 years' time span.	

Source: Nahuelhual, L., et al. 2007. Valuing ecosystem services of Chilean temperate rainforests. http://www.cepal.org/ilpes/noticias/paginas/4/31914/Nahuelhual_07_Eco_Services_Chilean_forests_GOOD.pdf

Ecosystem services delivered by Amazonian tropical forest

The Amazon provides a wide range of services for local communities as well as for the global population. Despite these crucial services, the Amazon undergoes massive deforestation. WWF published a report in 2009 to demonstrate the potential offered by marketing the ecosystem services supplied by the Amazon. The table below presents a number of significant ecosystem services provided by the Amazon forest and their related economic values, as far as they are known. As noted in the report, these different figures cannot be simply added together as they are based on different assumptions and the different services are not additional per se.

Table 3.2 Overview of ES and associated economic values provided by the Amazon

Ecosystem services	Economic value (\$US – year not communicated)
Production of non-timber forest products	50-100 / ha / year
Production of timber, net present value of Reduced Impact Logging (not necessarily sustainable production)	419-615 / ha
Erosion prevention	238 / ha / year
Fire protection	6 / ha / year
Pollination of coffee plantations from forest (Ecuador)	49 / ha / year
Disease protection	Unknown
Carbon storage - damage avoided due to CO ₂ emissions avoided	70-100 / ha / year
Carbon storage - value of total carbon stored in intact forest	750–10,000 / ha
Maintenance of biodiversity	Unknown
Cultural and spiritual aspects of the forest	Unknown
Existence value	10-26 / ha / year
Recreational and ecotourism use	3-7 / ha / year

Source: WWF. 2009. Keeping the Amazon Forests standing: a matter of values. <http://www.wwf.se/source.php/1229304/Keeping%20the%20Amazon%20forests%20standing.pdf>

Forest conservation and protected areas: Belize

As part of the initiative of the Programme for Belize (PfB), initiated by international conservation agencies, a study³ estimated the economic values of the Rio Bravo Conservation and Management Area. Rio Bravo contains about 100 000 ha of tropical rainforest, swamp/marsh and savanna, and is situated in the north west of Belize. The direct uses identified in the Rio Bravo are related to non-timber products (*Manilkara quianensis*, *Inga spp.*, *Brosimum rubescens*), allspice and chicle, medicinal plants (*Agondra racemosa*, *Simaruba glanca*, *Bursera simaruba*) and genetic material and tourism. Other regulating services have been identified such as carbon storage, soil conservation and flood control. Rio Bravo represents one the most outstanding natural reserves in Belize which delivers substantial benefits through intrinsic and existence values. The survey estimated the existence value for Rio Bravo by transferring estimates of willingness to pay for comparable areas and by calculating the amount of money given to the Programme for Belize to maintain the ecological services over time.

The methodology used GIS to calibrate the economic values from alternative sites for transfer to the site under scrutiny. This was achieved by first mapping the “strength” or “quality” of the natural capital assets in the Rio Bravo, then using the GIS maps to re-calibrate benefit estimates from alternative sites. The results of this process are “economic value maps”, showing the benefit value of natural capital assets in two-dimensions. In order to realise this exercise, 50 meters x 50 meters cells were used as basis geographical unit. The total economic value grid contained values ranging from \$US 43 to \$US 2000 per cell. The TEV of the average cells is equivalent to \$US 687, equivalent to \$US 227,288/km². Table 3.3 summarises the contribution of the different ES considered to this TEV.

Table 3.3 Results produced by the natural capital GIS

Ecosystem Services	Mean value (\$US/km²)
Allspice production	14.40
Chicle production	40.80
Non-timber products	10,661.60
Medicine	97,834.40
Genetic material	524.40
Tourism	136.00
Carbon storage	99,913.60
Soil conservation	1,900.40
Flood control	1,321.20
Existence (CV)	209.60
Existence (PfB)	14,732.00
TEV	227,288.4

Source: Eade, J.D.O. and Moran, D. 1994. *Spatial Economic Valuation: Benefits Transfer using Geographical Information Systems*.

Benefits of forest conservation for water services

Examples from Colombia, Mexico and Costa Rica demonstrate benefits in improving or maintaining water quality and quantity for downstream users by investing in natural ecosystems for biodiversity. The beneficiaries include water users such as water utilities, power production companies and bottle companies. By implementing sustainable land management activities in the hydrological areas, the landholder can also benefit through soil stability and conservation, and improvements in the nutrient cycle.

³ Eade, J.D.O. and Moran, D. Spatial Economic Valuation: Benefits Transfer using Geographical Information Systems. http://www.cepal.org/ilpes/noticias/paginas/4/31914/Eade_Moran_96_GIS_valuation_Belize.pdf

Colombia – Valle del Cauca – Water for Life and Sustainability (FAVS)

Valle del Cauca (Cauca Valley) is a highly productive and fertile region, with a huge number of sugarcane producers, an important export and domestic crop for the country. Sugarcane yields depend on the availability of water for irrigation, accounting for five to six irrigation cycles per year to maximise yields. Applying one less irrigation cycle per year would reduce sugar cane yields by 9% (10 tons/ha). Damages to the region's forest and the water resources threatening to reduce production might cost \$33 million each year. The water funds aims to improve groundwater recharge and stabilize local water supply. If the investments are effective on the ground to increase groundwater recharge over a period of seven years, the expected benefits for crop production would be around \$36.8 million yearly after the 8th year of activities. By using hydrological models and simulating the impact of the most cost-effective alternatives (Invest) of land uses to the greatest environmental benefits, the survey has estimated that according to the level of investment and the type of watershed, the reduction in erosion would be of 4% at the most conservative estimation to 5%-58% reduction in erosion for the best level of investment.

The water fund started to work in 2008 and has so far protected 11 sub-watersheds covering activities of conservation, restoration and/or best management practices implemented in 415,330 hectares. It has involved 1,491 families located in the upper side of the watersheds. The project has built 80 km of protected river fences, protected more than 87 headwaters, conserved over 250 hectares of land through restoration and natural regeneration, and converted more than 80 ha of critical land along streams to sustainable cattle ranching

(source provided by Aurelio Ramos, regional coordinator for LA&C of TNC).

Mexico: programme of Payments for Hydrological services (PSAH)

The PSAH is providing economic incentives in areas of hydrological importance in order to avoid deforestation in areas facing severe water problems. The PSAH set up some eligibility criteria giving priority to forest conservation of cloud mountain forests, areas where aquifers were overexploited and watersheds with high water scarcity problems or areas of high flood risk, forest located in areas of influence of population of more than 5,000 inhabitants and finally, those forest areas within the perimeter of protected areas. Since the time the programme was launched in 2003 until 2006, the PSAH has protected around 598,100 hectares, around 879 contracts have been signed with landowners from which more than half are contracts agreed with collective landowners. Of the total forest area covered by the system, 11% was in high or very high risk of deforestation in 2003; this share increased to 28% in 2004 and fell again to 20% in 2005. Between 10% and 25% of PSAH resources have gone to areas with overexploited aquifers and less than 7% to the most overexploited.

The Mexican payment system requires water users to pay for the benefits of clean water resources. For this purpose, a fiscal instrument was created in the form of a fee on water use. The percentage earmarked was fixed initially to 2.5% of the total water revenues. Finally, it was decided to allocate a specific amount of money (~US\$27.3 million) per year, which is very close to the proposed share. This amount of money is a proxy of the value of the environmental services provided by the programme.

The experience of the city of Coatepec in the State of Veracruz brought some lessons on the possibility to depend on the willingness to pay for PSA preserving groundwater and superficial aquifers. Coatepec is a city of 45,000 inhabitants and one of the main coffee production and trade in the region. Facing some water shortages, the mayor of the city asked the local authorities and the local water operator to add to the water invoice a donation equivalent to \$ 1 peso (US\$0.009) to be used in conserving forests. The first year, he received around US\$ 9,100. With additional funds coming from the State, 500 hectares of forests have been preserved by paying the landowner the equivalent of US\$90 per year per hectare.

(Source Muñoz-Piña et al. 2008)

The scale of benefits ranges from local to global. The environmental benefits are strongly related to the eligibility and prioritization of areas being targeted by the payment system, to the payment level and to the stakeholder's participation.

Water services beneficiaries in Costa Rica

The total private sector agreements engaged with the FONAFIFO (National Fund for Forest Financing) amounted to approximately to US\$ 560 mil per year (2004). The following companies are willing to pay for the water services they receive from the PSA.

- Energia global (hydropower company): from 1997 (5 year contract renewable) - US\$40 mil per year to protect 2,493 hectares in the San Fernando watershed and Volcain Sarapiquí watershed.
- Compania nacional de Fuerza y Luz (hydropower company) : from 1998, 5 year contracts renewable - US\$436 mil per year to protect 10,900 hectares of Aranjuez, of Lago Cote and Balsa watersheds.
- Hydro power Platanar – from 1999, 10 year contract renewable – US\$39 mil per year to protect 1,300 hectares of Platanar watershed.

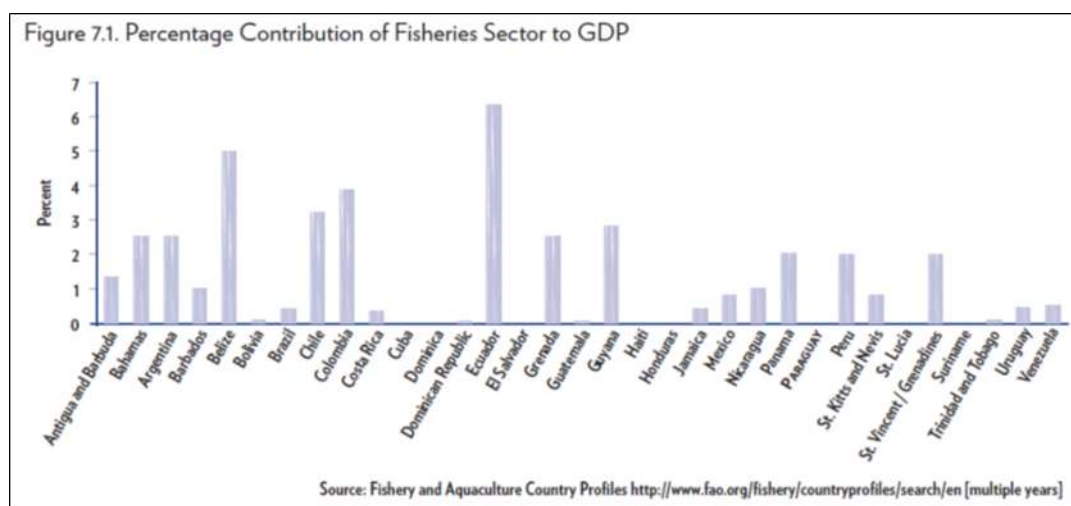
Other financial agreements have been signed by selling “environmental services certificates” which are standardized instruments to pay for the conservation of one hectare of forest in a specific area. The buyers are paying for a number of interested hectares. Among these buyers are agrobusiness companies (Azucares El Viejo, Las Costeña, Exporpac, Olefinas) and Tourisms companies (Desarrollo hotelero Guanacaste).

(Source: Pagiola, 2006 and Saenz, 2008)

3.2.2 Sustainable fisheries (Aichi Target 6)

Fisheries are of considerable importance to the economies of Latin American and Caribbean countries (Figure 3.1), and make an important contribution to sustaining livelihoods, jobs and local economies. However, the fish stocks in the region face considerable threats due to over-exploitation which in turn produces economic loss and depletes fish resources. In 1995, more than 57% of the fisheries in Latin America and the Caribbean were over-exploited and evidence suggests that the situation has worsened since then (Bovarnick et al. 2010).

Figure 3.1 Percentage of the contribution of fisheries to GDP in LA & the Caribbean region



Source: Bovarnick et al. (2010)

Economic losses caused by inefficient and harmful practices include (Bovarnick et al. 2010):

- The loss of productivity due to discards of targeted species, bycatch of non-targeted species (including species of commercial value in other fisheries) and ghost fishing by abandoned gear. Discard rates vary substantially by fishery and by gear. In Peru, the average discard rate was about 83% but 81% in the industrial shrimp trawl. In Argentina, discarding is 15% overall, but 24% in the southern hake otter trawl fishery and 50% in shrimp trawls.

- The costs associated with fishing fleet overcapacity.
- The costs associated with inappropriate subsidies promoting fishing overcapacity and/or excess fishing effort. LAC is third in the world in terms of total subsidies for fisheries, at \$US 1.9 billion per year.
- The costs associated with illegal, unreported, and unregulated (IUU) fishing which contributes to resource depletion and impedes recovery of fish populations and ecosystems.

Potential benefits and cost to the transition to sustainable management of fisheries

Yields

Depletion and fisheries collapse can incur high costs in terms of lost yields, as well as impacts on employment and other indicators.

By investing in maintaining or restoring natural capital and reorienting fisheries management toward maximum economic yield (MEY), net economic benefits will increase at MEY, even with slightly lower yields. For fisheries characterized by severe resource depletion, a shift from current state toward sustainable management will involve a temporary reduction in yields, but successful rebuilding will lead to increased yields over the long term.

Employment

As with production, restructuring national fisheries to be more economically efficient may require an initial reduction in employment, given that overcapacity (including labour capacity) is a major aspect of inefficiency in the sector. Temporary measures to prevent high unemployment, funded from gains in earnings, have buffered the transition. Addressing cases of chronic overfishing may lead to an increase in employment, sometimes in relatively short times. The costs of transition are likely to be lower in regions where the local economy is growing and alternative employment opportunities are already available. Such adjustments could create a more diversified employment (add-valued post-harvest processing for example) base and reduce overall vulnerability.

Fiscal Impacts

Sustainable management in fisheries needs investments in science and management capacity (including surveillance and control). At the same time, it implies reduction of inappropriate subsidies, which can release funds for investment in fisheries management. In addition, moving fisheries toward MEY generates increased returns on investment in the fishery, provides new opportunities for cost recovery, and improves the tax base. The net economic benefits of sustainable management of fisheries are likely to be higher if current subsidies represent a substantial fiscal cost and where the additional costs of management and control are offset by improvements in yields and a reduction in IUU fishing, both of which increase taxable business income.

Equity

In the near term, management changes are likely to create both winners and losers. Successful transition may depend on finding ways to limit economic hardship during the transition and mitigate costs to those who lose. Fisheries can be an essential source of food security, employment, and income; fisheries may provide a critical safety net for poor local communities. Mining the resource base may be an effective short-term strategy for individuals (and countries) to move out of poverty, but sustainable resource use is a necessary condition for fisheries to contribute to poverty reduction over the long run. The poor are disproportionately vulnerable to fisheries depletion and collapse because they lack economic alternatives; thus, they poor may benefit from the increased security of fisheries-based livelihoods associated with sustainable management practices. The distributional implications of fisheries management options, in particular changes to access rights, must be considered when developing under sustainable management strategies.

Source: Bovarnick et al. (2010).

3.2.3 Conservation and restoration of wetlands (Aichi Targets 5, 11, 14)

Most of the existing studies indicate that wetlands valuation has tended to focus on a few ecosystem services such as recreation, coastal habitat-fishery linkages, raw material, food production and water purification. Other ecosystem services are less widely estimated, such as carbon sequestration, water supply (recharge of aquifers), climate stabilisation and regulation, erosion control and flood protection).

WWF (2004) reviewed 89 different case-studies analysing the value of wetlands for the different regions on the world. Using a value transfer approach, covering 5 different types of wetlands⁴ and 10 different ecosystems services (flood control, recreational fishing, amenity/recreation, water filtering, biodiversity, habitat nursery, recreational hunting, water purification, materials and fuel wood), the study estimated the value of the wetlands in Latin America to be around **\$US 123 million per year** (\$US - 2000) (Table 3.4).

Table 3.4 Total wetlands area in Latin America and associated economic value

Wetland types	Surface (km ²)	Economic value (million \$US – 2000 value)
Mangrove	42,2240	8.44
Un-vegetated sediment	92,230	104.78
Salt/Brackish marsh	17,070	3.13
Freshwater marsh	2,890	0.53
Freshwater woodland	10,100	6.12
TOTAL	120,230	123

Source: WWF. 2004. *The economic value of the world's wetlands*.
<http://assets.panda.org/downloads/wetlandsbrochurefinal.pdf>

Wetlands cover approximately 40,000 km² in Central America, representing 8% of the total land area. They provide ecosystem services ranging from refuge for biodiversity to maintenance of water quality and climate change mitigation and adaptation. Annual primary productivity of some Central American wetlands equals or exceeds that of tropical rainforests. Despite these crucial services, wetlands are under continuous threats associated with population and development pressures, intensive deforestation and conversion of forest lands to agriculture.⁵

One study was conducted in the Terraba-Sierpe National Wetlands (HNTS)⁶, located in the Osa Peninsula of Costa Rica. This natural park covers 1,570 km² and comprises a mosaic of ecosystems and land cover (wetlands, tropical forest, beach, lakes and ponds, mangroves and plantations/croplands). The contribution of each ecosystem/land cover to the following ecosystem services was estimated: Food Production, Recreation & Aesthetic, Habitat & Refugium, Raw Materials, Disturbance Regulation, Waste Treatment, Biological Control, Gas & Climate Regulation, Refugium & Nursery, Refugium & Wildlife Conservation, Water Supply, Water Regulation, Pollination, Soil-Formation, Erosion Control, Nutrient Cycling, and Genetic Resources.

The study combined GIS data and peer-reviewed studies conducted between 1978 and 2008 on economic valuation of main ecosystem services. It estimated the contribution of each of ecosystem service through benefit transfers methods, to give a lower and higher bound estimate for each one (Table 3.5). The authors estimated that the whole Terraba-Sierpe area provides annual benefits in the range **\$US 287 million to \$US 1,179 million per year** (Table 3.5). Per hectare and per year, the contribution for each type of ecosystems/land cover was:

⁴ This study used the estimation of surface was extracted from the CCRU (2003) Global Wetland database

⁵ Ellison, A.M. 2004. Wetlands of Central America. <http://www.bio-nica.info/biblioteca/Ellison2004.pdf>

⁶ Earth Economics. 2010. Nature's values in the Terraba-Sierpe National Wetlands: The essential economics of ecosystems services.

- Mangroves - \$11,154 - \$ 33,929;
- Tropical forest - \$1,669 - \$ 5,511;
- Wetlands - \$1,731 - \$ 42,527;
- Lakes and ponds - \$83 - \$ 23,425;
- Plantations - \$8 -\$15;
- Beaches - \$58,734 - \$ 214,215.

It is likely that these values are underestimates due to gaps in valuation data.

Table 3.5 Values of ecosystems services in the Terraba-Sierpe National Wetlands

Ecosystems services	Mangroves		Tropical forest		Wetland		Lakes and ponds		Plantations		Beach	
	Low	high	Low	high	Low	high	Low	high	Low	high	Low	high
Food production	2.49	4,939.23	8.91	117.19								
Recreation and aesthetic	37.44	3,233.13	0.42	980.29	13.55	6,057.99	1.80	20,962.49			368.41	119,607.47
Habitat & refugium	313.31	332.12										
Raw material	22.41	1,973.13	64.01	1,502.10								
Disturbance regulation	2.39	12,675.09	5.32	5.32							58,365.09	94,607.88
Waste treatment	10,776.39	10,776.39	92.58	92.58	1,262.43	4,224.21						
Biological control												
Gas & climate change			32.81	58.58	12.09	12.09			8.19	14.64		
Nursery					2.55	8,125.20						
Wildlife conservation							62.67	1,574.76				
Water supply			11.26	11.26	0.19	20,352.99	18.23	887.96				
Water regulation			0.15	25.04	440.64	3,754.75						
Pollination												
Soil formation			10.64	10.64								
Erosion control			7.26	1,020.39								
Nutrient cycling			1,433.01	1,433.01								
Genetic resources			2.25	254.14								
Total value per ha	11,154.43	33,929.09	1,668.62	5,510.54	1,731.45	42,527.23	82.70	23,425.21	8.19	14.64	58,733.50	214,215.35
Total hectarea/type of ecosystem	13328		45420		6751		182		6060		863	
Total value per type of ecosystem	148,666,243.04	452,206,911.52	75,788,720.40	250,288,726.80	11,689,018.95	287,101,329.73	15,051.40	4,263,388.22	49,631.40	88,718.40	50,687,010.50	184,867,847.05
Total low value	286,895,675.69											
Total high value	1,178,816,921.72											

Source: Adapted from Earth Economics (2010)

3.2.4 Coral Reefs and Mangroves (Aichi Targets 7 and 10)

Coral reefs provide a wide range of ecosystem goods and services which are of high value and of critical importance for the local and national economies in the Caribbean. Despite this high value, the extent and health of the Caribbean coral reefs have declined dramatically in the last decades and continue to be threatened by human activities (e.g., overfishing, ocean acidification and invasive tourism).

For the whole Caribbean region, Burke et al. (2008)⁷ estimated that, in 2000, the Caribbean's coral reefs provided ecosystem goods and services with an annual net economic value of \$US 3.1 billion to \$US 4.6 billion. The ecosystem services valued are related to fisheries, dive tourism, and shoreline protection services. These figures represent conservative estimates of the value of coral reefs, as they only consider subset of the goods and services provided by coral reefs. Table 3.6 illustrates these different benefits together with the estimates of potential future decline in these values associated with the continued degradation of coral reefs.

Table 3.6 Economic value and potential losses from coral reef degradation in the wider Caribbean

Ecosystem Good or Service	Estimated Annual Benefit (2000)	Estimated Future Annual Losses
Fisheries	\$US 312 million	Fisheries productivity could decline an estimated 30-45% by 2015 with associated loss of net annual benefits valued at US\$ 100-140 million (in constant-dollar terms, standardized to 2000).
Dive tourism	\$US 2,100 million	Growth of Caribbean dive tourism will continue, but the growth rate by 2015 could be 2-5% lower as a result of coral reef degradation. Region-wide losses of net annual benefits are valued at an estimated US\$ 100-300 million (in constant-dollar terms, standardized to 2000).
Shoreline protection	\$US 700 – 2,200 million	Over 15,000 km of shoreline could experience a 10-20% reduction in shoreline protection by 2050 as a result of coral reef degradation. The estimated loss in net annual benefits is estimated at US\$ 140-420 million (in constant-dollar terms, standardized to 2000).
Total	\$US 3,112 – 4,612 million	US\$ 350 – 870 million

Source: Burke, L., Cooper, E. and Bood N. 2008. *Coastal Capital: Belize – The Economic Contribution of Belize's Coral Reefs and Mangroves*.

In 2005, the World Resource Institute (WRI) initiated a project to develop and implement a national scale economic valuation methodology for coastal capital in the Caribbean.⁸ Different valuation studies resulted from this project and others are still on-going.

Faller et al. (2010)⁹ estimated the total economic value provided by coral reefs, sea grass and mangroves in Martinique. The study considered direct, indirect and non-usable ecosystem services such as fishing, and diving, the gross value added measure was used in the estimation. The replacement cost method was used to value protective and regulatory functions such as coastal protection. Budget estimates of spending on education and research were used to measure non-use values. On average, coral reefs are valued at US\$

⁷ Burke, L., and J. Maidens. 2004. "Reefs at risk in the Caribbean." Washington DC., USA: World Resources Institute.

⁸ More information about this project are available at: <http://www.wri.org/our-work/project/coastal-capital-economic-valuation-coastal-ecosystems-caribbean>

⁹ Failler, P., Petre E. and Marechal, J-P. 2010. Valeur économique totale des récifs coralliens, mangroves et herbiers de la Martinique. Available at: <http://etudescaribeennes.revues.org/4410>

2.3 million per km². As shown in table 4.7, sea grass is valued at US\$2.8 million per km², and mangroves are valued at US\$2.45 million per km². The valuation results suggest that mangroves and sea grass deserve the same protection as reefs to continue to provide crucial ecosystem services.

Table 3.7 TEV from coral reefs, mangroves and sea grasses in Martinique (2010)

Ecosystem services		Coral reef	Mangroves	Sea grass
Direct ES	Fisheries ^a	0.28	0.034	-0.051
	Tourism activities	1.56	1.81	1.02
Indirect ES	Coastal protection	0.37	0.08	1.59
	Biomass (fish)	0.12	0.09	0.00
	Carbon sequestration	0.00	0.01	0.01
	Water purification	0.00	0.22	0.14
Non-usable ES	Cultural value	0.07	0.20	0.08
	Research and education	0.01	0.01	0.00
TOTAL		2.34	2.45	2.81

Values are expressed in million dollars/km²/year. Exchange rate
1USD= 0.762 euros (2010).

^a Includes both commercial and leisure fisheries

Source: Failler, P., Petre E. and Marechal, J-P. 2010. Valeur économique totale des récifs coralliens, mangroves et herbiers de la Martinique. Available at: <http://etudescaribeennes.revues.org/4410>

Burke et al. (2008) valued the ecosystem services related to reef and mangrove-related fisheries, tourism, and shoreline protection services in Belize. The total value of these services was estimated to be \$US 395-559 million per year. As a reference point, Belize's GDP totalled US\$1.3 billion in 2007. Coral reefs and mangroves are highly interconnected habitats, physically supporting each other and providing habitat for fish species. For example, mangroves filter sediment and pollutants from coastal runoff, supporting the clean water favoured by corals. Many species important to fisheries and tourism rely upon both mangrove habitat and coral reefs for a portion of their life-cycle. As stressed in the report, this study did not directly evaluate the independent contributions of mangrove and coral reef habitats to the fisheries and tourism sectors, but assessed their collective value. To produce a rough estimate of the breakdown by habitat, the study examined the proximity of mangroves to coral reefs across Belize to estimate the portions of fisheries and tourism values that (1) rely exclusively on coral reefs (2) rely exclusively on mangroves, and c) depend upon both. The values presented in Table 4.8. In order to transpose these figures to values per square kilometre, the mangrove and coral reef surfaces identified in the WRI study have been used, namely: 1400 km² of coral reef and 400-420 km² of mangroves (Table 3.8).

Table 3.8 Estimated coral reef and mangroves contribution to the Belizean economy

	Coral reef	Mangroves	Combined contribution
Tourism	\$ US 0.1 – 0.12	\$US 0.15 – 0.18	-
Fisheries	\$US 0.01	\$US 0.01	-
Shoreline protection	\$US 0.08 – 0.13	\$US 0.28 – 0.39	-
Total per km2/year	\$US 0.19 – 0.26	\$US 0.44 – 1.02	-
Total for all Belize/year	\$US 268 – 370	\$US 174 – 249	\$US 395 - 559

Note: Mangrove & reef fisheries and tourism values are not additional, as they include revenues that rely on both habitats.

Values are expressed in million \$US/km2/year unless indicated differently (\$US 2007).

Source: Burke, L., Cooper, E. and Bood N. 2008. *Coastal Capital: Belize – The Economic Contribution of Belize's Coral Reefs and Mangroves*.

Burke et al. (2008) estimated the value of coral reef-related tourism and recreation, fisheries and shoreline protection services in Tobago and Saint-Lucia. The economic impact of coral reef-associated tourism and recreation and fisheries is evaluated analysing the financial flows generated in these industries and their impact on the economy. The study did not only consider the direct benefits associated with tourism and fisheries activities but also the additional indirect economic impacts, driven by the need for goods to support tourism and fisheries (such as boats, towels, beverages, fuels, etc.). Shoreline protection services were evaluated using a modified avoided damages approach, where the value of a reduction in wave-induced erosion and property damage due to coral reefs is estimated. The study presented yearly economic benefits for Trinidad and St-Lucia and did not provide data per square km. The aggregated values were converted to per square km data by dividing them by the surface of coral reefs in both regions. As acknowledged in the study, estimates of reef surface are from different sources and vary. The maps used by the study were extracted from the Millennium Coral Reef Mapping Project¹⁰ and national data sources suggesting that reef area is about 30 km² in Tobago and 33 km² in Saint-Lucia.

Sarkis et al. (2010)¹¹ estimated the total economic value of the coral reef located in Bermuda focusing on 6 key ecosystem goods and services such as tourism (strongly dependant on coral reef), fisheries (associated with reefs), amenity and surplus value of real estate (due to reef) and recreational, cultural, research and educational values. Using different valuation techniques, the total value associated with these ecosystems services was estimated at between \$US 488 million per year and \$1.1 billion per year, with an average value of \$US 722.4 million per year. The GDP of Bermuda amounted to US\$5.85 billion in 2007; the TEV of coral reefs represents thus 12% of Bermuda's GDP. In order to estimate the benefits value per square kilometre, they have been divided by the area covered by the study, namely 400 km².

A general overview of economic values is presented in Table 4.9. The benefits associated with the different services provided by coral reefs (and many other ecosystems) vary largely depending on local circumstances, ecological characteristics and their location.

¹⁰ <http://imars.usf.edu/MC/index.html>

¹¹ Sarkis, S., Van Beukering P.J.H. and McKenzie, E. 2010. Total Economic Value of Bermuda's Coral Reefs: Valuation of Ecosystem Services. Available at: http://ipbes.unepwcmc-004.vm.brightbox.net/system/assessment/191/references/files/566/original/Total_Economic_Value_of_Bermuda_s_Coral_Reefs_-_Valuation_of_Ecosystem_Services_Technical_Report_2010.pdf?1364314252

Table 3.9 Overview of different valuation studies of coral reefs in the Caribbean region

Ecosystem services		Study 1 ¹² - Martinique *	Study 2 ¹³ – Trinidad**	Study 2 – St Lucia**	Study 4 ¹⁴ – Bermuda ***
Direct ES	Fisheries ^a	US\$0.21	\$US 0.02 – 0.03	\$US 0.02 – 0.04	\$US 0.012
	Indirect impact from fisheries	-	\$US 0.004 – 0.008	\$US 0.002 – 0.005	-
	Tourism activities	US\$1.56	\$US 1.45	\$US 2.77	\$US 1.015
	Indirect impact from tourism	-	\$US 1.93 – 2.86 ^b	\$US 2.01 – 3.09	-
Indirect ES	Coastal protection	US\$0.37	\$US 0.6 – 1.1	\$US 0.85 – 1.51	\$US 0.665
	Biomass (fish)	US\$0.12	-	-	-
	Amenity	-	-	-	\$US 0.017
Non- usable ES	Cultural value	US\$0.07	-	-	\$US 0.091
	Research and education	US\$0.01	-	-	\$US 0.006
TOTAL		US\$2.34	\$US 4 – 5.45	\$US 5.65 – 7.41	\$US 1.806

* Values are expressed in million euros/km²/year. Exchange rate 1USD= 0.762 euros (2010).

** Values are expressed in million \$US/km²/year (2006 \$US).

*** Values are expressed in million \$US/km²/year (2007 \$US).

^a Fishery include the different types of fisheries: commercial, leisure, etc.

^b Indirect economic impact are benefits for both Trinidad and Tobago

Source: ICF GHK based on literature referenced in the studies.

3.2.5 Benefits of Nagoya Protocol (Aichi Target 16)

Aichi Target 16 concerns the implementation of the Nagoya Protocol, relating to access and benefits sharing for genetic resources.

The costs and benefits associated with delivering this target will vary from one country to the other depending on their legal framework with regard to the access to genetic resources and the fair and equitable sharing of benefits arising from their utilisation. A report published in 2012 but mainly based on country analysis made before the adoption of the Nagoya Protocol in October 2012 makes the following analysis of the situation in Central America, South America and the Caribbean:

“Latin America and the Caribbean is an area of high biological and cultural diversity and similarly high activity on the access to genetic resources and the equitable sharing of the benefits (ABS). At the regional level, both the Andean Community and the Central American

¹² Failler, P., Petre E. and Marechal, J-P. 2010. Valeur économique totale des récifs coralliens, mangroves et herbiers de la Martinique. Available at: <http://etudescaribeennes.revues.org/4410>

¹³ Burke, L. et al. 2008. Coastal Capital – Economic Valuation of Coral Reefs in Tobago and St. Lucia. Available at: http://pdf.wri.org/coastal_capital.pdf

¹⁴ Sarkis, S., Van Beukering P.J.H. and McKenzie, E. 2010. Total Economic Value of Bermuda's Coral Reefs: Valuation of Ecosystem Services. Available at: http://ipbes.unepwcmc-004.vm.brightbox.net/system/assessment/191/references/files/566/original/Total_Economic_Value_of_Bermuda_s_Coral_Reefs_-_Valuation_of_Ecosystem_Services_Technical_Report_2010.pdf?1364314252

countries have ABS measures, although the latter are still in draft form. In addition to countries discussed below (Brazil, Colombia, Costa Rica, Peru, Panamá, México and Venezuela), several other Latin American countries are in various stages of creating and implementing ABS measures. Other countries with some ABS measure in place are Bolivia, Ecuador, Argentina (at the provincial level), and Guyana. There appears to be a lesser degree of activity in the Caribbean with some initiatives in Cuba (a general regulation for research on biological resources exists), Dominica (a draft ABS Law exists) and Saint Lucia (as part of a comprehensive biodiversity law)"(CISDL, 2012, p. 10). Since the adoption of the Nagoya Protocol, 3 countries in Central America have ratified the Protocol: Honduras, Mexico and Panama.

The theoretical benefits associated with the implementation of the Nagoya Protocol and the Aichi target 16 are multiple. However, the quantification of these benefits is a difficult task due to their scale and nature. The key benefits identified in the project documents and literature is detailed below.

From a socio-economic perspective, the implementation of the Nagoya Protocol will help to ensure that the benefits associated with the utilisation of the genetic resources of a particular country are equitably shared within this country, especially when the resources leave the country. The establishment of clear and transparent legal frameworks on the access and use of the genetic resources will also favour the advancement of research in the field of bioprospecting in Latin America and the Caribbean. This will generate major socio-economic benefits through the creation of direct employment in Latin-American based businesses involved in bioprospecting and bioassays, and through economic multiplier effects in related service industries. The new findings emerging from these bioprospecting activities will then benefit society as a whole and the country providing the genetic resources in particular. Support to the implementation of the Nagoya Protocol will also enable recipient countries to overcome the high transaction costs which are associated with the establishment of a clear legal framework for ABS. As stressed by a UNEP funded project document, these transaction costs make the benefits sharing principles associated with the implementation of the Nagoya Protocol relatively elusive (UNEP, 2011).

From a pure social perspective, the implementation of the Nagoya Protocol will lead to the development of clear provisions on access to traditional knowledge associated with genetic resources. These will assist Latin American countries in strengthening the ability of indigenous and local communities to benefit from the use of their knowledge, innovations and practices. The Nagoya Protocol will also provide incentives for the promotion and protection of traditional knowledge by encouraging the development of community protocols, minimum requirements for mutually agreed terms and model contractual clauses related to access and benefit-sharing of traditional knowledge associated with genetic resources.

Finally, from an environmental perspective, the implementation of the Nagoya Protocol should help to increase the incentive to protect biodiversity.

3.3 Distribution of benefits

The evidence above demonstrates that achieving the Aichi targets will benefit a wide range of individuals and sectors in society, at different spatial scales. For example:

- Local people will benefit from maintaining the provisioning services of ecosystems, such as food, fibre and fuel, but may also benefit in the short term from their over-exploitation or conversion;
- Individuals and business in the wider local community benefit from maintaining a variety of regulating services (including water purification and regulation, control of natural hazards and erosion, pollination) and cultural services (including recreation and tourism);
- The global community will also benefit substantially from the Targets, especially through climate regulation and the existence values of biodiversity.

For many of the Targets, a large proportion of the benefits accrue to the global community. This is especially the case for Target 5 (reducing the rate of deforestation), since the region contains a large proportion of the remaining global forest resource and maintains valuable stocks of carbon. Studies demonstrate the substantial global benefits of the conservation and sustainable use of forests.

In other cases, a much larger proportion of the benefits of achieving the Targets may be realised locally. For example, the protection of coral reefs (Target 10) delivers valuable benefits to local tourism and fisheries sectors, as well as delivering regulating services which benefit local communities.

Achieving the Targets will benefit a wide range of economic sectors, such as agriculture, fisheries, forestry, energy, water and tourism, by supporting their long term sustainability, but may reduce the output of some sectors such as forestry, fisheries and agriculture in the short term.

Poorer people will be the greatest strongest beneficiaries of the Aichi targets, because they depend most directly on ecosystems for their livelihoods – through the provision of food, fibre, fuel and fresh water, and the essential regulating and supporting services that sustain them.

However, these dependencies may often lead local users to over-exploit or convert ecosystems in the short term, leading to the loss of benefits for the wider local and global community. PES schemes - in which the beneficiaries of ecosystem services compensate land managers for the conservation and sustainable use of ecosystems – have been successfully developed in the region, and have an important role in incentivising the delivery of the Aichi targets and ensuring that the benefits are shared equitably.

4 Investment needs

4.1 Key findings on investments needs

- A recent regional workshop reviewing progress towards the Aichi targets in the LAC region provides some useful insights into overall investment needs.
- This found that countries have made strong progress in the achievement of some Targets (e.g. 11 – protected areas; 12 - species conservation) 17 - NBSAPs, 18 - traditional knowledge and 19 - science and technology).
- Countries have indicated a low level of achievement for targets 3 (incentives), 6 (sustainable fisheries), 9 (invasive species), 10 (preservation of coral reefs), 13 (genetic diversity), and 14 and 15 (ecosystem restoration). This suggests that greatest efforts need to be devoted to these areas. This has implications for investment needs, but low levels of progress also reflect other challenges such as political barriers.
- The evidence reviewed indicates that a priority in many countries is to create the enabling conditions and institutional frameworks to achieve the Aichi targets. These include development of appropriate governance and legal frameworks, incentive mechanisms, capacity and knowledge on which biodiversity action depends.
- Priorities differ across the sub-regions. In the Caribbean region, a high priority relates to the conservation of marine and coastal environments.
- In Central America and South America, a key priority is to develop sustainable financing mechanism to respond to multiple objectives (protected areas and sustainable agriculture, afforestation, reforestation and forest restoration).
- The Aichi targets are interrelated and effective implementation will depend on timing and sequencing of actions to achieve optimal effect. In particular, investments in capacity building and appropriate institutional and policy frameworks will be important in delivering Aichi Targets 1-4 and 17-20 and in creating the conditions needed to deliver all other targets.

4.2 What types of investments and activities are needed to deliver the Aichi targets and to secure these benefits?

Regional evidence highlights the need to build effective governance structures, in order to develop, implement, monitor and enforce the policies and actions needed to deliver the Targets, and this forms an important starting point in assessing investment needs.

Two main sources of evidence were found in assessing investment needs:

1. Regional reviews of the state of implementation of the Targets and the scale of action required to meet them; and
2. NBSAPs and other national and local initiatives which document specific priorities in each country.

4.2.1 Regional evidence

Some insights into investment priorities at the regional level can be developed from the findings of a workshop to analyse the level of progress in achieving the Aichi targets¹⁵. The attending countries gave a summary of their progress towards achievement of the Aichi targets since they were introduced in the Strategic Plan. Not all the countries of the region were represented in this workshop and the information shown here covers only a small part of the region (Table 4.1). Nevertheless, it provides a first view of how countries rate their achievements to date, and identify which Aichi targets require more attention in the future.

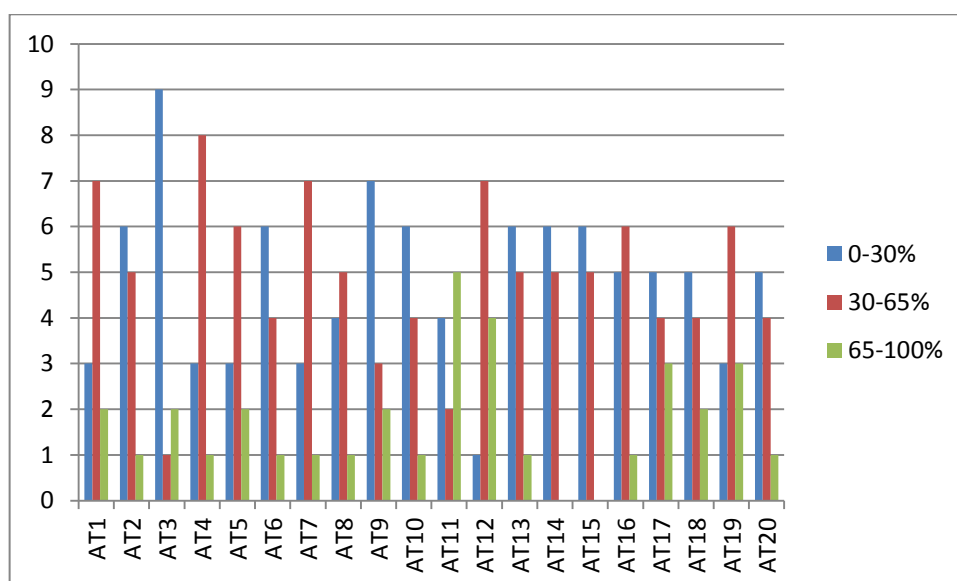
¹⁵ Taller regional para America Latina sobre la actualizacion de las estrategias y planes de accion nacionales en materia de diversidad biologica, Villa de Leyva, Colombia 2013.

Table 4.1 LA&C countries attending the regional workshop

Latin America and the Caribbean	
South America	Central America
Argentina	Costa Rica
Bolivia	Guatemala
Brazil	Honduras
Chile	Mexico
Colombia	Nicaragua
Ecuador	Panama
Caribbean	
Cuba	
Dominican Republic	

The attending countries had the option to classify themselves in a range that goes from a low (0-30%) to a medium (30-65%) or high (65-100%) level of achievement of the Aichi targets. The figure below presents the overall situation from the 12 countries that have provided this information.

Figure 4.1 Countries' estimates of their level of achievement of Aichi targets*



Source (UNEP-CDB 2013)

(*) This figure does not include information from Costa Rica, Colombia, Ecuador, Guatemala or Peru.

Whilst it is difficult to generalize a trend for the entire region, it is clear that there are variations in levels of achievement between countries and between targets. Progress tends to be greatest in areas of traditional conservation activity (Targets 11 – Protected Areas; 12 – Species Conservation; and 19 – Science Base). However, the review also noted differences in levels of legal designation of protected areas and in their long term effectiveness, which also depends on awareness, involvement and support of local institutions and communities. The absence of financial mechanisms to support compensation schemes or to favour the flow of benefits to local stakeholders and communities is a potential risk for biodiversity conservation.

The region is quite diverse and the social and economic conditions also differ from one country to another. These differences impact on the capability of the country to reconcile

development benefits with environmental objectives. To demonstrate the value of biodiversity conservation is one step to increase awareness, but it could be insufficient if no actions are taken to strengthen institutional capacity and coordination among and across public entities. That is the reason why the inclusion of biodiversity conservation into sectorial policies and the involvement of economic stakeholders are a priority in the region. Some countries have also stressed the necessity to work on programmes of environmental education, knowledge enhancement and sharing and communication. In the same way there is a need to enhance and reinforce strong collective institutions of local communities with emphasis on education and local development.

Some of the indicators that countries have put forward to measure their progress towards the Aichi targets are related to the number of plans implemented for sustainable management of biodiversity in agriculture, forestry and fisheries. The number of plans implemented will depend on the level of engagement of stakeholders and local communities as well as on the available technological options or alternative practices to enhance changes in production systems. Most of these elements require technical skills on the ground and appropriate mechanisms for transfer of know-how. Financial support is necessary not only to finance the changes (and compensate for opportunity costs) but also to enable local communities to take advantage of new business opportunities based on sustainable management of biodiversity.

Targets which present particular challenges for implementation – with six or more of the 12 countries reporting progress of 30% or less – include Targets 2 (biodiversity values), 3 (incentives), 6 (sustainable fisheries), 9 (invasive species), 10 (coral reefs), 13 (genetic resources), and 14 and 15 (ecosystem restoration).

It is clear that significant action and investment will need to be focused on these Targets. However, it is less evident whether the limited progress towards these Targets to date reflects the overall levels of investment needed, or other challenges such as political barriers to change. While the scale of investment needed is likely to be a significant barrier for some targets (e.g. the restoration targets 14 and 15), others may depend more on achieving the levels of awareness, institutional capacity and governance structures necessary to tackle conflicts and effect change. It is likely therefore that delivering the Targets will depend not just on the levels of investment allocated to them, but also on the careful targeting and sequencing of investments to create the right conditions for change. This is reflected in the views expressed by workshop participants, which highlighted the importance of activities that address the obstacles to the delivery of these Targets, including scientific, legal, and institutional and policy components, as well as general attitudes and awareness.

4.2.2 Financing needs to achieve the Aichi targets from National Biodiversity Strategies and Actions Plans in the LA & the Caribbean region and country specific insights

This section analyses the financial needs from the perspective of the NBSAPs and other evidence from national or local projects. This analysis confirms the areas of main concern and the main investments made to fulfil the CBD's objective and therefore the Aichi targets.

As well as the investments needed in land management and ecosystem restoration, the preceding regional review and the review of NBSAPs and national needs also highlight the importance of investments in creating the enabling conditions needed to meet the Targets. These enabling conditions require investments in:

- Awareness and attitudes towards biodiversity and its conservation
- Training and capacity building
- Legal frameworks and governance structures
- Scientific knowledge
- Financial frameworks and incentive structures.
- Monitoring, evaluation and enforcement mechanisms.

These enabling investments are often required at the project level, to support the effective delivery of conservation activities (Table 4.2).

Table 4.2 Enabling actions to support conservation delivery

Case studies	Training and education programmes
Argentina: Establishment of incentives for the conservation of ecosystem services of global significance (GEF project)	■ Capacity building for design and implementation of PES schemes ■ Training at different levels to support the up-scaling of the pilot PES.
Conservation of the Biodiversity of the Paramo in the Northern and Central Andes (GEF Project)	■ Integration of topics related to the Paramo ecosystem in the curriculum of relevant schools ■ Communication activities ■ Advocacy activities ■ Publications of technical reports ■ Training to raise the technical knowledge among rural inhabitants and field professionals ■ Organisation of workshops to exchange best practices among participants
Brazil: Rio de Janeiro Sustainable Integrated Ecosystem Management in Production Landscapes of the North-Northwestern Fluminense (GEF project)	■ Dissemination of best practices through media campaigns ■ Education through school programmes ■ Training of local communities and project executors on natural resources management ■ Technical training of recipients through field trips and field training

■ Awareness and attitudes

Most countries in Latin America and the Caribbean highlight the need to increase awareness and enhance attitudes towards biodiversity conservation and ecosystem services among decision makers, stakeholders and the wider public. In many cases this is related to the observation that this lack of knowledge at policy level is one of the barriers identified for the implementation of conservation programmes. A convinced political class requires less time to put into effect the best legal, administrative, and regulatory measures to support environmental goals.

These types of investments contribute directly to Aichi Targets 1 (awareness raising) and 2 (integration of biodiversity values into decisions), as well as supporting the delivery of other targets.

■ Training and Capacity Building

Training and capacity development – for policy makers, administrators and stakeholders at the national, regional and local levels – play an important role in supporting the delivery of conservation actions, and crucially the integration of biodiversity considerations into a range of development, land use and sectorial policies and initiatives.

Guatemala NBSAP (2012-2020)

From the total budget for the NBSAP (approximately US\$290.88 million), 37% will be invested in territorial institutions and coordination of actors, 17% in awareness and valuation assessment, 39% in sustainable landscapes and planning for conservation, 5% in the prevention of threats and 5% in the restoration of biodiversity and ecosystems services.

Argentina - Enhancing political will and knowledge

One of the crucial components of the Argentinian project “Establishment of incentives for the conservation of ecosystem services of global significance” is to train policy-makers and decision-makers at different levels about the relevance of ecosystem services, the existence of different land use practices with different environmental impacts and the development of PES schemes. This training element is not only present in the dedicated component of the project but also in the component aiming at supporting the development of a strong legal framework for the up-scaling of the pilot PES schemes at landscape level. From the analysis of the GEF financing of the Argentinian case study discussed above it appears that activities related to the development of the knowledge base at different decision-making level (outcome 1 and 2 of the project) is higher during the first year of the project (16% of the total budget) but then stay stays stable during the last three years of the project (from 12% to 8% of the total budget) (GEF. 2010. Request for CEO endorsement/approval – project 3623, p.7).

Antigua and Barbuda's NBSAP (2000-2010)

The Antigua and Barbuda's NBSAP have defined as the main priority: The sustainable use, protection and conservation of Antigua and Barbuda's biodiversity; the coordination of all efforts and activities involving the sustainable use, protection and conservation of this biodiversity; the enforcement of all policies, regulations and legislation affecting these efforts and activities; the knowledge and understanding of the processes governing biodiversity, and the information required to guide and coordinate the activities involving the sustainable use, protection and conservation of this biodiversity.

In the period from 2000-2010, Antigua and Barbuda have been making progress in most of the areas of the NBSAP but some areas are still considered as having a low level of implementation. There are related to:

- Establishing the appropriate user's fee for biodiversity conservation; increasing the training of staff and the number of staff in the forestry, agriculture, fisheries, and environmental divisions.
- Using the results of the Research Program, to develop appropriate management techniques and mechanisms to ensure sustainable consumptive use, and to preserve non-consumptive use values of biodiversity resources.
- Implementation of national regulations that address biodiversity management policies.

■ Legal frameworks and governance structures

For some countries, there is a need to review, adapt or enhance an appropriate legal framework in order to develop sustainable mechanisms to support the inclusion of conservation activities in the main sectorial policies or to support the environmental sector. Most often, countries build upon the existing structures and adapt or modify them in order to increase the cost-efficiency of policies. However, in other cases the investment might be more significant if completely new regulations, financing programmes or agencies need to be put in place.

Bahamas NBSAP (2009-2010)

In order to achieve the overall objectives of biodiversity conservation, there are some obstacles that need to be overcome, such as:

- Lack of national capacity (e.g. technical skills, resources, equipment) to protect biodiversity;
- Lack of resources – manpower, technical skills, equipment and funding;
- Lack of a data management and information system to analyse trends;
- Lack of enforcement of environmental regulations;
- Lack of indicators for tracking progress for the implementation of goals.

■ **Appropriate incentive structures and financial frameworks**

Implementing conservation actions on the ground depends on putting in place appropriate financial structures and incentives to deliver the resources required. Finance is needed for a range of activities such as:

- Financing of change in land use management practices and restoration activities through PES schemes or other innovative financial mechanisms (e.g. water funds);
- Implementation of improved ecosystem management and sustainable land management practices;
- Development of sustainable forest management and REDD+ projects;
- Implementation of participative management plans and conservation agreements at local level;
- The creation and strengthening of protected areas (terrestrial and marine).

In the cases of the projects financed by GEF and the World Bank, these operational activities are often associated with the development of pilot projects at local level. Considering the local scale of these pilot projects, the scale of the necessary investment varies considerably from one project to another. Costa Rica is one country which has placed significant emphasis on creating the financial frameworks and incentive structures needed to deliver the conservation activities required (see box).

Operational investments needs in Costa Rica

One of the key elements of the success of the Costa Rica payment system is its capability to raise the necessary financial resources to finance the payment system for environmental services. By law, FONAFIFO was authorized to create trusts, to issue securities and bonds, to negotiate projects and to receive grants or credits (Saenz 2008). From the beginning, Costa Rica had benefited from grants provided by international donors such as the World Bank and the bilateral technical cooperation with USA (AID), and then with the Netherlands, Sweden and Finland under a SWAP agreement, supplemented by other donations (Ecomarkets and Mainstreaming Market Based Instruments for Environmental Management projects from GEF and the Huetar Norte Forest Program from German aid agency, KfW) (Pagiola 2008). These latter donations enabled the securing of biodiversity conservation activities in protected areas or in areas of strategic concern for preserving biodiversity.

FONAFIFO also receives finance from the government budget, in particular through the collection of 3.5% of fuel tax revenues and 40% of timber tax (Art. 43 of the Forest Law 7575). This latter flow of revenue has never been collected due to some challenges that must be dealt with.

Costa Rica has made progress in securing financial resources over the long term by collecting payments for ecosystem services from beneficiaries of watershed conservation schemes, including hydropower, beverage and water utility companies.

Regarding mitigation of CO₂ emissions, Costa Rica was able to sell carbon emission credits through the emission of Certifiable Tradeable Offset (CTO) which represented an externally certified 1-tonne net reduction in carbon emissions. The first impetus was given by the payment of US\$2 million for 200,000 CTOs from the Norwegian Government and a consortium of Norwegian power producers. Costa Rica obtained a contract through the World Bank's BioCarbon Fund that enables the country to negotiate sales of about 0.61 million tonnes of carbon dioxide equivalent (tCO₂e) by 2017 for activities related to planting trees in agroforestry systems, natural regeneration and commercial plantations (Pagiola 2008).

Regarding the final expected ecological services which are related to the provision of scenic beauty for recreation and ecotourism, the potential buyers are concentrated on the tourism sector (hotel and recreation companies) and are quite scattered and diverse. No contract has been signed between these stakeholders despite the country being one of the finest destinations in Central America for its landscape and biodiversity.

In institutional terms, the three Forest Laws were enacted (Ley de reforestation N° 6184 in 1977, Ley Forestal N° 7032 in 1986 and Ley Forestal N° 7575 in 1996) improving the national capabilities of the country to capture financial resources, besides the national provision, to be used to feed the payment systems. In particular, the Law enacted in 1996 has changed the justification for payments from support for the timber industry to the provision of environmental services (Pagiola S. 2008). The

creation of the ministry in charge of the environment (Ministerio del Ambiente y Energía, MINAE) in 1986 as well as of the National Fund for Forest Financing (Fondo Nacional de Financiamiento Forestal, FONAFIFO) in 1996 have contributed to establishing a sustainable and effective payment system and officially have established the national program for payments for environmental services.

Investment in social capital in Mexico

Mexico represents an interesting case in which the national payment for environmental hydrological services was established to benefit Mexican ejidos and communities (landowners holding collectively the forest land). The efficiency of the payments in preserving the forest land depend on the size of the group, the quantity and quality of resources and the costs and benefits of cooperation. The more profitable conservation of forest is for local communities the more local communities are ready to invest in maintaining cooperation in the management of the collective forest. In order to ensure compliance with the contracts obligations, there is a need to invest in social capital and cooperation practices among the ejidos.

■ Scientific knowledge

Scientific knowledge and evidence plays an important role in guiding biodiversity conservation actions, and assessing their effectiveness. As well as being central to Aichi Target 19 it therefore makes an important contribution to all of the other Aichi targets. Some studies are necessary to identify priority areas and criteria of eligibility of the measures. Some economic analyses are needed to assess the payment level and demonstrate the most cost-effective measures compared to other alternatives. Data acquisition and indicators are part of the monitoring systems that are necessary to show the performance of the systems or readjust them when necessary.

Colombia - Data and information collection and R&D

Colombia (Water Fund Cauca Valley, South-western Colombia). One of the key components of the project is to use scientific tools to help decision-makers and investors to obtain a greater return of investment in the identified conservation areas. With the support from the Natural Capital Project (encompassing Stanford University, University of Minnesota, TNC, WWF) and the international Center for Tropical Agriculture (CIAT), the project has used hydrologic models to identify priority areas for conservation using land use alteration scenarios; it has proceeded to a cost analysis of investment alternatives, using different activities that would be developed to identify which alternatives were most cost-effective and finally, it has prepared an investment portfolio with medium and long terms goals for the fund (FAO, 2013).

■ Monitoring, evaluation and enforcement mechanisms

Monitoring, evaluation and enforcement play an important role across the Targets, in enhancing the effectiveness of conservation actions. Monitoring and evaluation are required to gather evidence of the effectiveness of conservation actions and to inform further adaptation. Enforcement mechanisms are necessary to ensure compliance, and are central to the effectiveness of legal measures, such as protected areas (Aichi Target 11) and species protection measures (Target 12). Enforcement is also needed to underpin incentive measures and PES schemes, including to prevent free-rider behaviour or problems of leakages or slippage (e.g. where payments support a particular portion of forest land but increase pressures in surrounding forested areas). Securing compliance is necessary to reduce the negative consequences of any breach of contracts but also to secure investments and investors who require legal guarantees.

4.3 Where would these investments be best directed or focused?

In the Caribbean region, the main priorities are related to the reinforcement of a national system of protected areas or the creation of protected areas (terrestrial and marine). This is

the case for the Bahamas, Barbados, the Dominican Republic, and Grenada. Others have geared their actions to generate or expand sustainable management in agricultural activities; this is the case in Jamaica, Trinidad and Tobago. It is worth noting that preserving marine and coastal areas produces huge economic benefits to tourism and fisheries which are the main activities boosting the GDP of these countries. PES schemes and more supportive public funding programmes offer greatest potential to deliver positive change in the middle and upper income countries in the Caribbean.

In Central America, countries confirm the need to consolidate their national system of protected areas with emphasis on the implementation of strategies related to changes in agriculture and livestock production. Afforestation, reforestation and restoration will enhance benefits at the global level (carbon sequestration) and increase local benefits related to water supply and water regulation.

In South America, the main strategies aim to ensure sustainable financing mechanisms through payment for environmental services or water funds – in order to address drivers of deforestation and ecosystem decline. These strategies require protected areas management, sustainable agriculture and livestock production and restoration of key ecosystems.

4.4 Which targets will these investments help to meet, and what are the synergies and overlaps between targets?

The Aichi targets are interrelated and effective implementation will depend on timing and sequencing of actions to achieve optimal effect.

In particular, investments in capacity building and appropriate institutional and policy frameworks will be important in delivering Aichi Targets 1-4 and 17-20 and in creating the conditions needed to deliver all other targets. These are all dependent on awareness raising (Target 1), scientific evidence (Target 19) and the integration of biodiversity values into development plans and sectoral policies (Target 2).

Investments related specifically to Aichi target 3 will help to develop the economic incentives needed to deliver a wide range of Aichi targets. The main priorities relate to the design and implementation of payments of environmental services (PES) and the establishment of water funds, as well as the reform of negative incentives such as fisheries subsidies. These initiatives aim to conserve forest resources and/or protect aquifers and watersheds, emphasising the linkages between forest resources and the provision of environmental services of water ecosystems.

Sustainable agriculture, forestry, aquaculture and fisheries (Targets 6-7) and effective protected areas (Target 11) will relieve pressures on ecosystems more widely and help in the delivery of other Targets such as 5 (ecosystem protection), 8 (pollution control), 10 (coral reefs) and 14-15 (restoration).

The box below shows how achieving sustainable agriculture (AT 7) is linked to actions required under a range of other Aichi targets.

Links between sustainable agriculture (AT7) and other Aichi targets

The Dominican Republic has as its main priority to engage in activities for sustainable land management in the upper *sabana Yegua* Watershed, which is related to **Aichi target 7**. To achieve this objective it is necessary to solve problems related to insufficient and inadequate policies both at local and national level and the limited institutional capacity and cross-communication between different national agencies. It also requires working to increase social capital and knowledge on alternative methods of agriculture. Finally, to compensate for the costs of changing agricultural practices, there is a need to ensure appropriate resources for incentives measures (**AT 3**).

In **Brazil**, has an initiative to promote sustainable integrated ecosystems management in production landscapes of the North-North western Fluminense (NNWF), which is related to Aichi target 7. As in

the Dominican Republic example, this area is suffering from insufficient human institutional capacity and weak community organisations at the local and state level, from a limited number of sustainable land management plans adapted to the specific agro-ecological conditions to the (NNWF) area (AT4), insufficient systematized data and information for decision-makers to incorporate ecosystems-level considerations into production activities (AT 19) and the need to ensure the financing of incentives measures (AT 3). Increased awareness of ecological and environmental issues (AT 1) will be important in underpinning changes in both policy and practice.

Table 4.3 Examples of funding allocation in GEF projects.

Aichi target	Type of financial needs	Funding allocated to the project	Problem solving
Dominican Republic: Demonstrating Sustainable Land Management in the Upper Sabana Yegua Watershed System (GEF project 2512)			
AT7+AT4	Adaptation of policy frameworks Administrative costs	US\$635,880	Insufficient and inadequate policies both on local and national level
AT 5	Training and technical advice and implementation	US\$2,125,400	
AT3	Operational cost: Incentives measures for local farmers	US\$554,800	Lack of access to finance and ensure long term financing for securing best practices
Brazil: Rio de Janeiro Sustainable Integrated Ecosystem Management in Production Landscapes of the North-Northwestern Fluminense (GEF project 1544)			
AT7+ AT4	Adaptation of local policy and Administrative costs and organisation	US\$1,168,000	Low institutional capacity + development legal ramwork for ecosystem management and PES schemes
	Adaptation of local policy	US\$164,000	Development legal framework for ecosystem management and PES schemes
	Administrative costs: negotiation and cooperation	US\$618,000	Support community organisation and strengthen local institutions
	Administrative costs: R&D and technical assistance	US\$406,000	Lack of technical skills and knowledge
	Administrative costs: training of staff for project management	US\$562,000	Lack of skills of technicians
AT 1	Administrative costs: training and environmental	US\$350,000	Increase awareness and knowledge on environmental issues

Aichi target	Type of financial needs	Funding allocated to the project	Problem solving
	education		
AT3	Operational costs: incentives	US\$8,532,000	Financial support for sustainable natural resource management

5 Resource requirements

5.1 Key messages related to resource requirements

- In order to assess resource needs, we have analysed the current financing allocations in the region, sources of funding and available evidence of the resources needed to achieve the Aichi targets.
- We only find evidence available on actions related to protected areas or areas which need to be covered to protect species and key ecosystems. These actions are related to Aichi targets 11(protected areas), 12(species conservation), 10 (preservation of coral reefs) and 3 (incentive measures).
- The total annual conservation expenditures in the Latin American & the Caribbean region have been estimated to amount to an average of **US\$632 million per year (2001-2008)**, from which **US\$ 203 million were allocated to Central America, US\$ 395 million allocated to South America** and approximately **US\$ 33 million to the Caribbean countries**.
- Most funding for biodiversity in Central America comes from international donors and bilateral cooperation. However, domestic resources account for the majority of funding in South America and the Caribbean.
- The total current funding for protected areas **was estimated to amount to approximately to US\$239million per year in South America, US\$141 million per year in Central America and \$54 million per year in the Caribbean**.
- There are significant funding gaps. For protected areas alone, it is estimated that funding will need to **increase by 2 to 3.2 times** on current levels in South America to meet identified needs, and by **1.5 to 2.3 times in Central America**.
- Since countries in the region estimate that their progress towards Aichi Target 11 (protected areas) is ahead of that for other targets, the funding gap for other Targets may be greater than for Target 11.
- The resource needs have to be considered above the current financial allocations. The current allocations have not halted the continuous degradation of biodiversity in protected areas which makes necessary additional resources to reach optimal management.
- Resource requirements increase significantly if other activities, where progress has so far been limited, are considered (e.g. restoration of key ecosystems – Aichi Targets 14 and 15).
- The main sources of financial resources are government spending, international cooperation and fees from users. In some countries, the level of national investment is too low compared to other sources of funding. International funding can be more effective in those areas where the enabling conditions allow for progress in conservation activities, or where funds can be directed to areas that create those institutional frameworks.
- Though detailed quantitative evidence is limited, the findings largely support those of the High Level Panel's report to COP11.

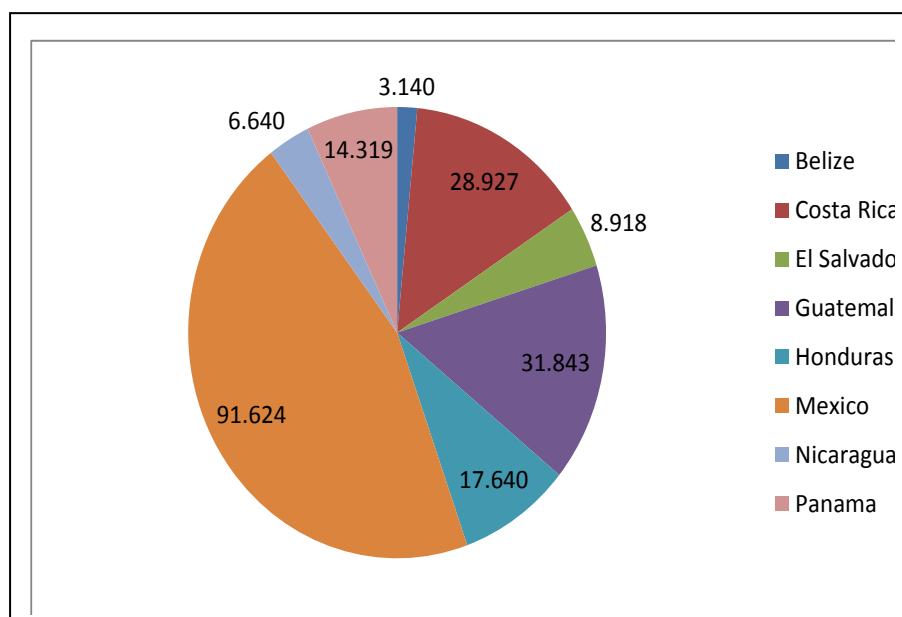
5.2 Current expenditures on biodiversity conservation

- Waldron et al (2013) undertook a global assessment of funding resources provided by international donors, bilateral cooperation, domestic funding and other innovative financial mechanisms to achieve global conservation priorities. They found that global spending amounted to US\$19.8 billion (2005 base dollars) annually between 2001 and 2008. They concluded that some countries experienced differences between the expected and the observed funding for biodiversity conservation. For instance, according to this study, finance for biodiversity in Trinidad and Tobago was lower than would have

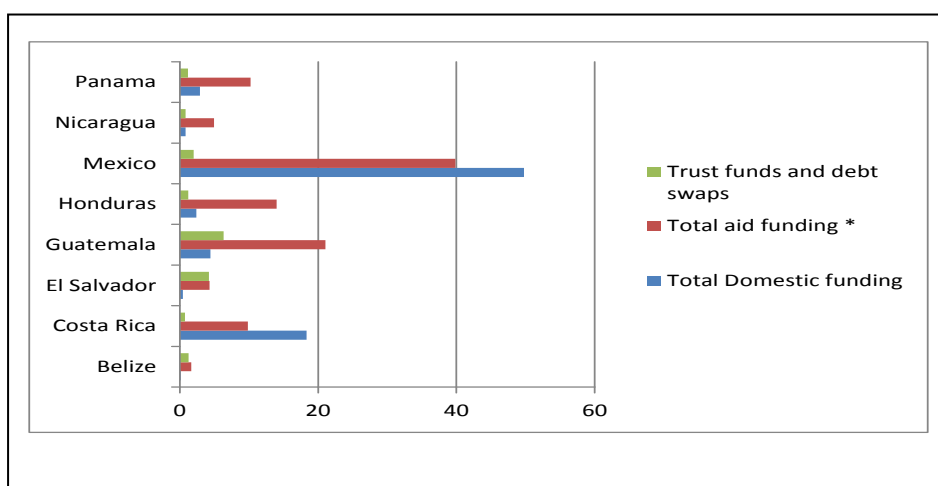
been expected considering the importance of biodiversity in its territory (with under-funding estimated at US\$4.38 million per year).

Extracting from the Waldron et al. (2013) database (2001-2008)¹⁶, total annual conservation expenditures in the Latin American & the Caribbean region amounted to an average of US\$632 million per year, from which US\$ 203 million were allocated to Central America, US\$ 395 million allocated to South America and approximately US\$ 33 million to the Caribbean countries.

Figure 5.1 Total average annual spending in Central America (2001-2008) in US\$ million (base 2005)



Source: Adapted from Waldron et al. (2013)



Source: Adapted from Waldron et al. (2013)

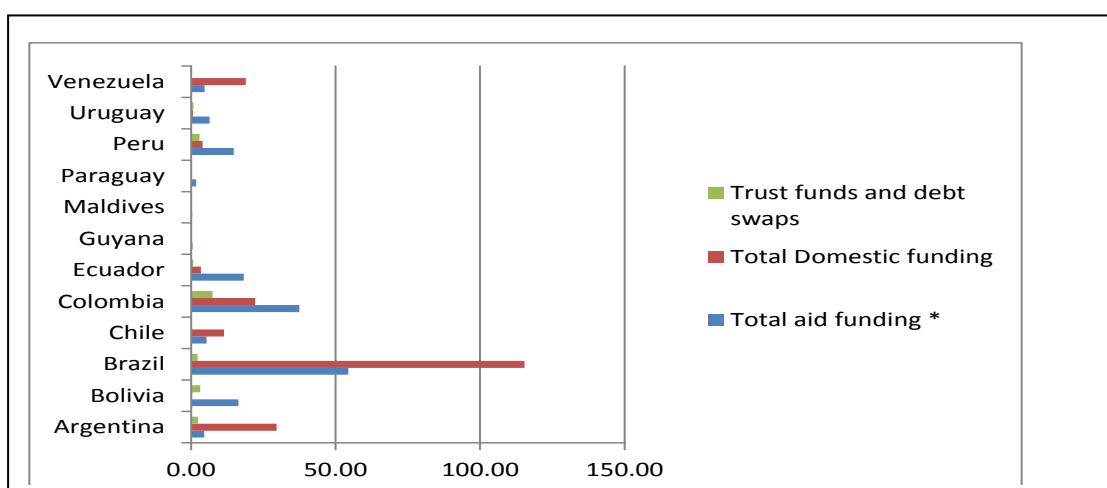
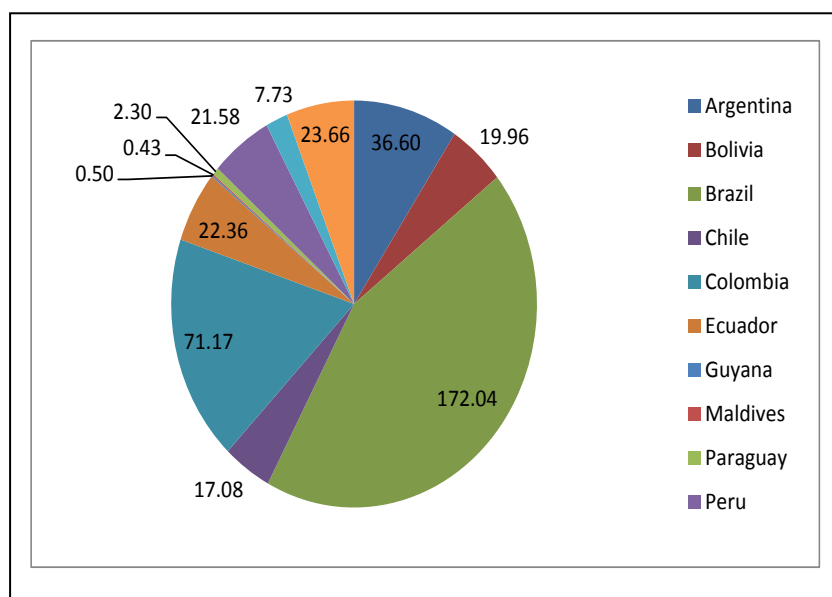
Between 2001 and 2008, Central America received the equivalent of US\$ 203 million annually for investments related to biodiversity conservation. Total aid received from

¹⁶ The database is available at: www.pnas.org/lookup/suppl/doi:10.1073/pnas.1221370110/-/DCSupplemental.

international donors and bilateral cooperation represented 52% of the total funding, against 39% from domestic resources and 9% from special funds (trust funds and debt-swaps). Domestic funds include national public funding as well as payments from user fees that are reinvested in biological conservation in these areas. The situation varies across countries; some countries have developed the institutional capabilities to levy additional funds from beneficiaries of ecosystems services as well as ensuring a constant flow of resources from national expenditures (e.g. Mexico and Costa Rica which have set up tax systems to finance conservation activities). User fees¹⁷ varied widely in their importance, ranging from 9% in Mexico to 75% in Honduras.

In South America, the situation was also found to vary between countries. For Ecuador, approximately 90% of the funding went to the Galapagos and almost 39% was estimated to be financed by user fees. The spending in the case of Brazil is underestimated, due to the non-inclusion of States' funding which might be considerable. Colombia has allocated important resources to finance areas collectively-owned by indigenous communities which are home the richest biodiversity in the country. This funding was not included in the analysis. In Bolivia, it was estimated that 95% of the domestic funds come from user fees against approximately 5% of public funding.

Figure 5.2 Total average annual spending in South America (2001-2008) in US\$ million (2005 dollars base)

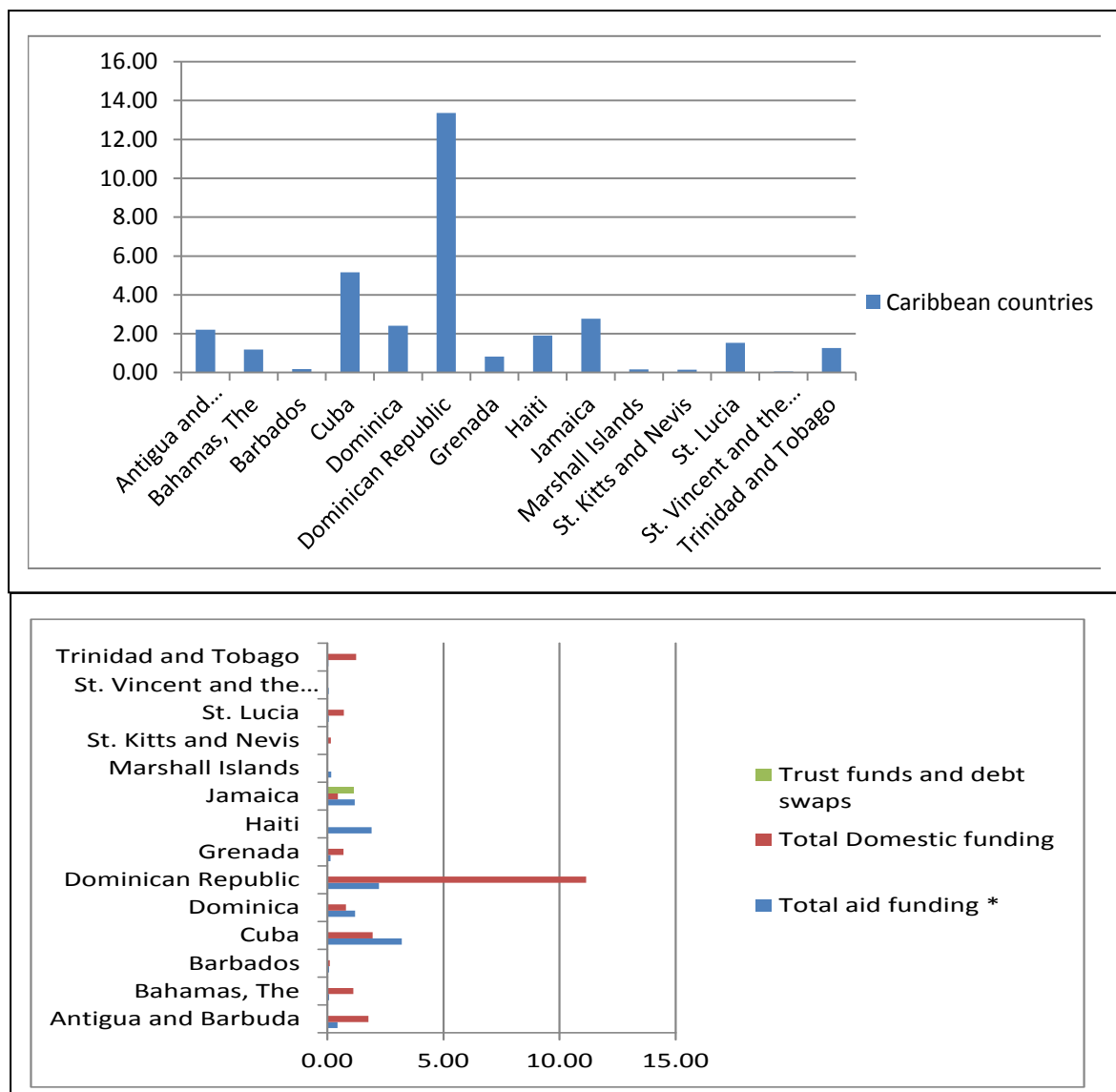


¹⁷ These figures are conservative due to investment by the main NGOs operating in these countries whose investments increase the domestic financial contribution.

Source: Adapted from Waldron et al. (2013)

In the Caribbean, the average annual spending is lower than in the rest of the region. From US\$ 33 million annually, one third of the total average spending of the Caribbean was financed by international donors; the rest was financed by domestic funds and other trust funds and debt-swaps. The Caribbean is strongly dependent on tourism, but the study found little accurate evidence of the use of the revenues from tourism in conservation activities.

Figure 5.3 Total average annual spending (2001-2008) in the Caribbean



Barbados, Grenada, Marshall Islands, St Kitts and Nevis and Grenadines were estimated to have lower levels of investment, ranging from US\$ 60,000 to US\$160,000 annually over this period.

5.3 Resource needs and funding gaps for protected areas

Evidence of gaps in current funding provision is given by a regional analysis of funding in protected areas (Bovarnick et al. 2010)¹⁸. The Latin America and the Caribbean region, containing 40% of the Earth's biodiversity, has 4,111 designated protected areas covering a surface of 500 million hectares of which 466 million are terrestrial and 34 million are marine. The survey assessed current funding for protected areas and compared it to the needs which are necessary to cover management activities under two scenarios: the first one estimated the resources needs to fulfil a basic management plans of protected areas and the second estimated the resources needed for optimal management. The main actions included in the management of protected areas relate to administration and planning (infrastructures, communication tools etc.), patrolling and enforcement (activities that reduce threats to protected areas), environmental education, research and monitoring, enhancement of local economic and social development compatible with conservation, mitigation and restoration and sustainable use of resources (tourism). "Basic management" refers to the level of funding required to operate key programmes to sustain the maintenance of ecosystem functions in protected areas, whereas "optimal management" refers to the ideal level of funding required to operate all the programmes to reach and sustain optimal ecosystem functions in protected areas.

Management costs of protected areas

Recurrent costs:

- Human resources: salaries for park director, managers, park guard, scientists, community liaison officers, tourism specialists and financial specialists.
- Maintenance: office, vehicular maintenance, path maintenance.
- Utilities: water, electricity and communications.
- Basic equipment: GPS devices, boots, uniforms, machettes and torches.

Capital costs:

- Infrastructures, capital equipment and vehicles, and other investments related to tourism activities.
- Professional services for R&D and training.

(Source: Bovarnick et al. 2010)

For the whole region, total current funding for protected areas in South America and Central America was estimated to amount to US\$ 380 million per year (table 6.1 and 6.2). Of this, funding in South America was estimated to amount to US\$239 million per year and Central America to US\$141 million per year. Financial gaps were estimated by considering current available resources and comparing these to the level of resources required under the basic and optimal scenario of management. The average annual expenditure in Mesoamerica¹⁹ was estimated at US\$ 4.59 per hectare per year and in South America at US\$ 1.39/ha/year (Bovarnick et al. 2010).

For South America, the financial gaps were estimated to from US\$ 249 million per year to US\$ 540 million per year. In the case of Central America, the funding gap was estimated at between US\$78 million per year and US\$187 million per year.

¹⁸ Bovarnick A.J. Fernandez-Baca, J.Galindo and H. Negret. 2010. Financial Sustainability of Protected Areas in Latin America and the Caribbean: Investment Policy Guidance. UNDP-TNC.

¹⁹ Includes countries from Central America, Cuba and Dominican Republic.

Table 5.1 Resource needs for protected areas in Latin America (million per year, 2010)

Country	%PA	Current funding	RN basic Mgt	RN Optimal Mgt	Financial gaps to basic Mgt	Financial gaps to Optimal Mgt
Argentina	7.36	31.309	39.512	60.366	8.203	29.057
Bolivia	15.48	5.102	5.374	9	0.272	3.898
Brazil	8.71	133.415	302.573	471.731	169.158	338.316
Chile	14.93	9.194	17.974	26.754	8.78	17.56
Colombia	10.21	20.166	25.15	42.755	4.984	22.589
Ecuador	13.97	3.977	6.73	14.04	2.753	10.063
Paraguay	15.17	1.24	9.7	19.5	8.46	18.26
Peru	13.51	13.067	25.172	41.842	12.105	28.775
Uruguay	0.9	0.816	3.409	4.355	2.593	3.539
Venezuela	20.21	20.628	52.23	88.791	31.602	68.163
Total		238.914	487.824	779.134	248.91	540.22

RN basic Mgt: Resource needs to respond to basic management activities

RN optimal Mgt: Resource needs to respond to optimal management activities

Source: From Bovarnick et al. (2010)

Table 5.2 Resource needs for protected areas in Central America (US million per year, 2010)

Country	%PA	Current funding	RN basic Mgt	RN Optimal Mgt	Financial gaps to basic Mgt	Financial gaps to Optimal Mgt
Belize	24.62	-	-	-	-	-
Costa Rica	23	29.645	31.934	44	2.289	14.355
El Salvador	3.6	3.803	4.445	7.557	0.642	3.754
Guatemala	30.29	8.339	16.118	27.401	7.779	19.062
Honduras	21.75	4.122	6.618	11.251	2.496	7.129
Mexico	11.81	80.214	120.321	160.428	40.107	80.214
Nicaragua	12.96	5.314	19.546	43.321	14.232	38.007
Panama	19.05	9.506	19.88	33.796	10.374	24.29
Total		140.943	218.862	327.754	77.919	186.811

RN basic Mgt: Resources needs to respond to basic management activities

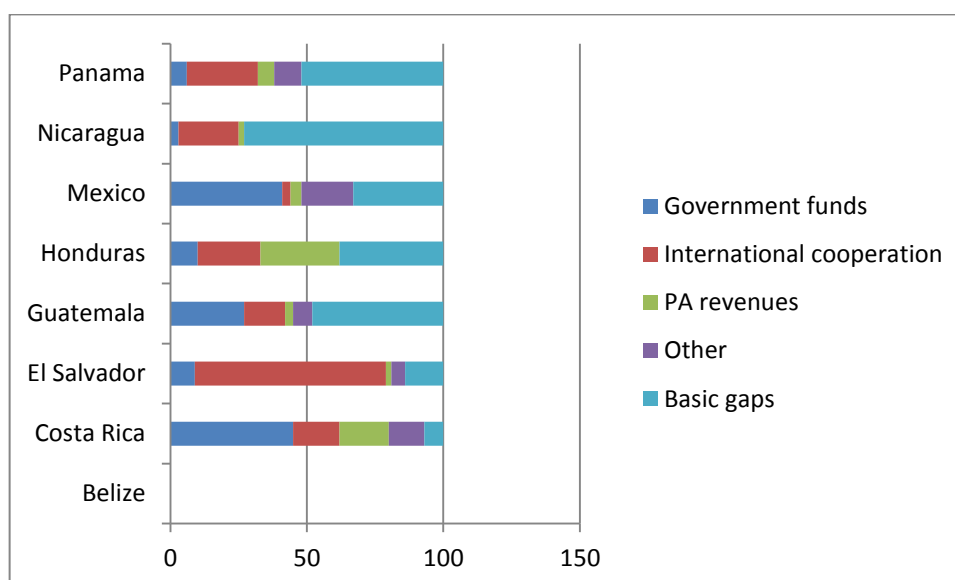
RN optimal Mgt: Resources needs to respond to optimal management activities

Source: From Bovarnick et al. (2010)

This analysis suggests that funding allocated to protected areas would have **to increase by 2 to 3.2 times current levels in South America 1.5 to 2.3 times current levels in Central America in order to meet the estimated** management costs of protected areas.

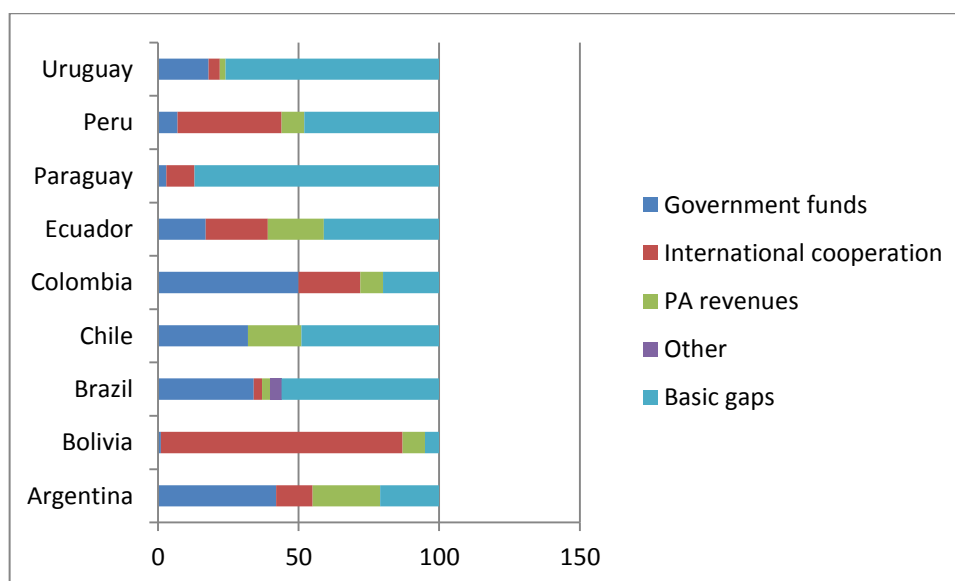
Bovarnick et al also estimated the sources of funding for protected areas. Government funds were estimated to represent 60% of total current funding, international cooperation to provide 15%, revenues of protected areas 11%, and other sources (taxes, or funding for specific projects benefiting protected areas) the remaining 14%. Countries with an important contribution from government budgets are Venezuela, Colombia, Brazil, Chile and Mexico. Some countries are almost wholly dependent on international funding mechanisms. These include Nicaragua, El Salvador, Bolivia, Panama and Peru. Countries such as Ecuador, Honduras and Argentine receive approximately one third of their financial contributions from revenues generated by user fees.

Figure 5.4 Financial resources and gaps as a percentage of financial needs under the basic scenario in Central America



Source: From Bovarnick et al. (2010)

Figure 5.5 Financial sources and gaps as a percentage of financial needs under the basic scenario in South America



Source: From Bovarnick et al. (2010)

For the Caribbean region, the analysis of resource needs was obtained by combining information from the NBSAPs and information provided by the CBD website on protected areas. For those countries where information was not available from these sources, we took as reference the current spending derived from Waldron et al. (2008) as we considered that the minimum resources needed to cover the current spending in significant areas of conservation. We found information specifically for Cuba in Bovarnick et al (2010) in which it is indicated that the additional funding to operate a basic management in protected areas is approximately of US\$7.7 million per year.

Resource needs were estimated at US\$54 million per year. This figure is quite conservative.

Table 5.3 Estimated resource needs in the Caribbean (US\$ million per year)

Caribbean countries	%PA	RN in CDB PA
Antigua and Barbuda	0.79	4.340
Bahamas, The*	0.54	7.000
Barbados	0.07	0.550
Cuba**	16.43	7.732
Dominica***	3.7	2.420
Dominican Republic	25.95	9.286
Grenada	0.15	9.717
Haiti***	0.11	1.90
Jamaica***	7.43	2.77
Marshall Islands***	0.62	0.16
St. Kitts and Nevis*	0.77	3.443
St. Lucia	2.04	3
St. Vincent and the Grenadines	1.23	0.48
Trinidad and Tobago	9.6	0.875
Total		53.679

* Resource needs from NBSAP

** Resource needs based on Bovarnick et al (2010)

*** Resource needs indicated in Waldron et al. (2013)

Section 4.2 above found that countries in the region estimated that their progress towards Aichi Target 11 (protected areas) was ahead of that for other targets. **This suggests that the funding gap for other Targets may be greater than for Target 11.**

5.4 Resources needed to deliver PES schemes

Payments for ecosystem services will play an important role in meeting Target 3 (biodiversity incentives) and in supporting the delivery of other targets, particularly those related to reducing habitat loss (Target 5), sustainable land management (Target 7) and ecosystem restoration (Targets 14-15).

Some evidence was found of the resources deployed by Costa Rica, Mexico and Colombia in developing and administering PES schemes (Table 6.4).

The figures show that many of the resources needed were invested to develop the institutional basis upon which the schemes have been based. This included substantial investments in data collection and management as well as studies to support the policy intervention, and capacity building measures.

Examples of Innovative financial mechanism (AT 3)

Colombia, Water fund in Cauca valley, Southwestern Colombia

Valle del Cauca (Cauca Valley) is a high productive and fertile region, with a huge number of sugarcane producers, an important export and domestic crop for the country. This region lies in a very rich hydrological system containing important watersheds supplying water to 900,000 people residing in the cities, including the city capital Cali. This region is quite sensitive to climate factors causing water scarcity during the summer. A **water fund** was implemented to improve water problems and sustain the local sugar industry.

Costa Rica, National programme of payment for environmental services

Costa Rica experienced in the 1970s the highest rate of deforestation. More than 55,000 hectares of forest were disappearing per year, leaving the country with barely one third of its forest cover (31.1%) in the total territory; in the 1980's this trend continued and the forest cover reduced to only 26.1% of the national territory. The main national environmental policy aimed at reversing the deforestation rate and increasing the forest cover up to 40% of the national territory. This positive trend has been driven by the implementation of a national **programme of payment for environmental services (Pagos por Servicio Ambiental, PSA)**

Mexico, National payment for environmental hydrological services

Mexico estimated its rate of deforestation at 1.3% per annum in the 1990s. While deforestation was unequally distributed among the diversity of types of forest and forested areas, the common feature explaining the continuing erosion of forests was the illegal logging and the conversion of forested land into agriculture and cattle ranching. The implementation of the **national payment for environmental hydrological services** has combined forest conservation and protection of water services.

Table 5.4 Comparison of financial needs for the implementation of PES programmes in Colombia, Mexico and Costa Rica.

Resources needs typology	Costa Rica	Mexico	Colombia (valle del Cauca)
Political will, capacity building and knowledge	High transactions costs. High investment in getting political consensus and ensure local cooperation and commitment	Design of the policy took two years (2001-2003). Strong support from academia for surveys, data collection, stakeholder consultation, technical advice from international experts in areas of hydrology and forest sciences. Financing came from the World Bank and a bilateral cooperation with France.	Strong institutional settings engaging in strategic partnerships and negotiations that raises around US\$7.3 million.
Adaptation of political framework	US\$110 million. More than 10 years in getting political consensus to implement PES and structure FONAFIFO		
Data and information and R&D	Important part in the design of the eligibility criteria, of the payment scheme and the targeted areas and population.	This is an on-going financial need to readjust the eligibility criteria and avoid rent seeking behaviour.	Important part of the design of the water funds (hydrological models, simulation tools, cost-effective strategies). Use of INVEST, SWAT, ECOSAUT.
Administrative measures	Strong technical support	Strong technical support	US\$1.8 million (initial allocation to cover operational costs, the technical secretary's salary and the necessary funding for conservation projects)
Operational activities	US\$15.5 million per year (2004). Fonafifo has benefited from public resources (3.5% of the revenues from fossil fuel sales tax), Grants from international donors and private-public agreements	US\$ 27,3 million per year, from 2004. Mainly using a fiscal instrument.	US\$1.4 million (2013): US\$0.1 million of the first water fund project; US\$0.6 million in the second proposal cycle and US\$0.7 million in the second proposal cycle
Monitoring, evaluation and enforcement mechanisms	Approx. US\$ 30,200 per year. Water users, beneficiaries of water services, are contributing up to 7% of the administrative costs of FONAFIFO.	Use of images by satellite as a way to ensure compliance. Most cost-effective way compared to the monitoring on site targeted by the payment.	US\$300,000 (TNC and CENICANA - top level research centre associated with the local sugar industry)

Source: ICF GHK (2013)

5.5 Comparison with findings of HLP first phase report

The review found relatively little quantitative evidence of the resources required to deliver the Aichi Targets. There is therefore limited scope to make direct comparisons with the previous estimates in the first phase report of the High Level Panel.

The evidence suggests that high levels of investment will be needed to deliver Targets 5 (averting habitat loss) and 11 (protected areas). This is in line with the findings of the first HLP report which identified these as the Targets requiring high levels of investment. However, no evidence was found on the overall costs of meeting Targets 8 (pollution control) or 14 (ecosystem restoration), which were also found by the first report to be among the most resource intensive targets to deliver.

The best evidence of costs at regional level relates to protected areas (Target 11). It is estimated that overall expenditures on the management of protected areas currently amount to \$1.4 per hectare per year in South America and \$4.6 per hectare per year in Central America, but that there is currently a significant funding gap which prevents optimal management being achieved. Estimates of optimal levels of expenditure on protected areas suggest an average resource requirement in the order of \$4.6 per hectare per year in South America and \$10.7 per hectare per year in Central America. These estimates are broadly in line with those used in the High Level Panel's report to COP11 which estimated overall annualised resource needs (including investments and ongoing management costs) in a broad range of US\$1 – 10 per hectare per year.

Other findings on resource needs also support the findings of the HLP report to COP 11, including:

- The importance of investment in governance, institutions, capacity and enabling policies, which, while it may not require very high levels of investment, plays an essential role in meeting the range of Aichi targets;
- The significant gaps in funding that currently exist relative to resource needs, and are a key factor in constraining delivery of the Targets; and
- The synergies and overlaps between Targets, which need to be considered in assessing the types of investments needed and the levels of resources required.

6 Policy alignment and development

6.1 Alignment between Aichi targets and other policy agendas

The evidence on the benefits of achieving the Aichi targets (Section 3) highlights the strong connection between environmental degradation and the social economic conditions facing local populations. Providing secure and safe environmental conditions, and maintaining the delivery of key ecosystem services, contributes to the people's livelihoods and to development outcomes.

Most of biodiversity conservation challenges in the Region are strongly related to poverty alleviation. Many of the examples highlighted in Section 3 make reference to the synergies with wider policies, in particular regarding the contribution to UN Development Agenda and Sustainable Development Goals (Table 6.1). Some evidence is available of the direct economic benefits of conservation activities. For example, protected areas support nature-based tourism and recreation. In Mexico, 5.5 million tourists visited federal protected areas in 2006, spending an estimated US\$286 million. In Peru, more than 350,000 people visited protected areas in 2005, generating US\$146 million of economic activity (Bovarnick et al. 2010).

Table 6.1 Positive linkages between protected areas, poverty reduction and millennium goals.

Dimensions of poverty	Protected areas goods and services	MIDs
Economic opportunities Income generation, housing, food, alternative livelihoods, education and acquisition of new skills	Subsistence, livelihoods and nutrition	Goal 1: Eradicate extreme poverty and hunger (direct contribution) Goal 2: Achieve universal primary school (indirect contribution)
Empowerment Governance mechanism, community participation, benefits to women, children and young, access and rights	Human and ecosystems health, traditional healthcare Social and cultural governance Drinking and irrigation water, hydropower and erosion control	Goal 3 : Promote gender equality (direct contribution) Goal 4: Reduce child mortality (indirect contribution) Goal 5: Improve material health (indirect contribution) Goal 6: Combat major disease (direct and indirect contribution)
Security Health, social cohesion, cultural traditions, maintenance of natural resources	Reduce and mitigate natural disasters Reduce and adapt climate change	Goal 7: Environmental sustainability (direct contribution) Goal 8: Global partnership for development (direct and indirect contribution)

Source: Bovarnick et al. (2010)

The table below demonstrates the social and economic benefits resulting from four biodiversity conservation initiatives across the region, and how these projects contribute both to the Aichi Targets and the Millennium Development Goals.

The examples demonstrate how delivering the Targets will contribute to basic development needs, such as food security, the provision of clean water, social cohesion and the development of sustainable livelihoods.

Table 6.2 Social and economic benefits and the corresponding Aichi target

Country	Project and Aichi targets	Social benefits	Economic benefits	Corresponding MDGs
Argentina	Establishment of incentives for the conservation of ecosystem services of global significance (AT 3, AT 5, AT 12, AT 7, AT 15, AT 11, AT 14)	14,000 families have improved access to potable water Profitability for poorest communities no quantified Equity in contracts assignment Capacity building	1,000 producers (farm products and tobacco) were able to irrigate some 19,000 hectares. Increase of local income	Goal 7: Environmental security Goal 1: Eradicate extreme poverty and hunger Goal 2: Achieve universal primary school Goal 3: Promote gender equality
Colombia	Water fund in Cauca valley, South western Colombia – local project (AT 3 AT 11, AT 14, AT 5 AT 15)	Food security Environmental education Capacity building for sustainable production Stakeholders participation Social cohesion Indirect payments in the form of materials and training (supply fences and seeds, etc.)	Avoid costs of water dependent industry estimated at US\$300 million per year. Avoid costs of water shortage for irrigation estimated to (9% of yields reduction, 10 tons/has).	Goal 7: Environmental security Goal 1: Eradicate extreme poverty and hunger Goal 2: Achieve universal primary school Goal 3: Promote gender equality
Ecuador	Water fund in Ecuador – local project (AT 3, AT 11, AT 14, AT 5 AT 15)	Environmental education program for children – 30,500 children. Food security Improve agriculture management Capacity building	Increase of employment in conservation activities Increase in income from rural conservation projects (hired, trained, and salaried 11 park guards). 200 families engaged in community development projects in rural basins.	Goal 7: Environmental security Goal 1: Eradicate extreme poverty and hunger Goal 2: Achieve universal primary school Goal 3: Promote gender equality
Dominican Republic	Demonstrating Sustainable Land Management in the Upper Sabana Yegua Watershed System (AT 7 AT 11, AT 15, AT 14)	Increase awareness about land degradation Improved access to medical services and education Technical assistance and training to local farmers Increase capabilities in governance	Increase in local employment Increase in access to income	Goal 7: Environmental security Goal 1: Eradicate extreme poverty and hunger Goal 2: Achieve universal primary school Goal 5: Improve material health

6.2 Implications for Delivery and Resource Requirements

The alignment with development goals and other policy agendas has important implications for the types of actions required to achieve the Aichi Targets, and for the resources required. In particular:

- The conservation and sustainable use of biodiversity in the region is closely linked to development and poverty alleviation. There is a need for better integration of biodiversity concerns into development plans and strategies (as required by Aichi Target 2);
- Biodiversity targets are closely linked to a range of sectoral policy areas, including agriculture, water, forestry, energy, fisheries and tourism. Achieving the targets cannot be met by biodiversity actions alone and requires biodiversity to be mainstreamed into these different policy agendas;
- These synergies have implications for the types of investments needed, and the resources required, and open opportunities for funding from a range of different sources;
- Synergies, overlaps and shared investment requirements can make it difficult to assess the resources needed to deliver the Targets. This may help to explain why expenditures and resource needs are best understood for core conservation actions, such as protected areas (Target 11);
- There are important implications for governance structures and institutional capacity. The need to mainstream and align biodiversity with other policy agendas requires greater awareness of needs and opportunities among a wide range of policy makers and delivery bodies, investment in training and capacity building, efforts to integrate biodiversity into plans and strategies, and effective co-ordination of delivery.

7 Cost-effectiveness

Overall, very little evidence could be found about how the Aichi Targets can be delivered most cost effectively in the region. However, there is some evidence that:

- Maintaining ecosystems and their services is likely to save costs** compared to allowing them to decline; and
- The way that the targets are delivered** – and the sequencing of overall delivery – **will have an important influence on their overall costs.**

Ecosystems provide key services cost effectively compared to man-made alternatives

Bovarnick (UNDP 2010) demonstrates that conservation actions, by maintaining ecosystems and their services, can be a cost effective means of addressing many of the priorities facing local communities and economies in the LAC region. In contrast ecosystem degradation can increase costs. For example, degradation of water systems often requires increased water treatment infrastructure and sediment removal machinery; soil fertility degradation requires inputs of fertilizer and other chemical products; reduced natural pest control requires increases in pesticide use, crop variation and management efforts.

The regulating services provided by ecosystems are also cost-effective in their ability to avert environmental damage and its costs on society. For example, forests, mangroves, coral reefs, wetlands and coastal ecosystems are important in providing protection against floods and natural disasters. Degradation of these ecosystems places increasing damage costs on society, as well as necessitating investment in man-made infrastructure such as flood defences. In Mexico, low-lying coastal areas are vulnerable to sea-level rise; by maintaining protected areas (the Girjalva-Mezcapala-Usumacinta Delta complex, Los Petenes and Sian Kaan Chetumal Bays), residents and communities received increased protection, especially in minimizing coastal erosion and reduced damage from storms and tidal surges.

Many of the benefits estimates in Section 3 are based on the avoided costs of ecosystem conservation. In Chingaza National Park, Colombia, the Bogota Water and Aqueduct Company saved more than US\$ 15 million in treatment costs in 2004 by investing in watershed improvements. In Honduras, the cloud forests of La Tigua National park (23,871 ha) provide over 40% of the annual water supply to 850,000 people of Tegucigalpa. Other similar cases are indicated in Table 7.1 (Bovarnick et al. 2010).

Table 7.1 Some examples of cities/metropolitan regions in LAC depending on water PA.

City	Protected areas
Cali, Colombia	Farallones de Cali National Park (150,000 ha)
Belo Horizonte, Brazil	Mutuca, Fechos, Roa-Moça & 7 other small protected areas (17,000 ha)
Santo Domingo, Dominican Republic	Madre de las Aguas Conservation area with 5 protected areas.

Source: Bovarnick et al. (2010).

Synergies between the Aichi targets mean that delivering some Targets will increase the cost effectiveness of meeting others

For example, Section 3 demonstrated that fisheries subsidies are substantial in the region. Subsidy reform is needed not only to meet Target 3 but should also help to reduce the costs of delivering Target 6 (sustainable fisheries) and 10 (coral reefs). It should also free up resources which can be used in marine conservation efforts. Marine Protected Areas have also been shown to be cost-effective means of improving fisheries management.

Section 4 (investment needs) highlights the importance of the enabling actions under Targets 1-4 and 17-20 in creating the conditions necessary for delivering the suite of Aichi

Targets overall. Evidence from the region suggests that prioritising these Targets will help to reduce the overall costs of delivery of the Aichi targets as a whole,

8 Costs and Benefits

8.1 Cost Benefit Analyses of Investments in Biodiversity and Ecosystems

Little evidence was found that directly assessed the costs and benefits of achieving one or more Aichi targets. However, some studies provide evidence that the benefits of relevant investments in biodiversity and ecosystems can exceed the costs.

The strongest evidence that the benefits of conservation exceed the costs relates to forest conservation, where studies have shown that the net benefits of conservation through REDD+ and other PES schemes widely exceed the opportunity costs, particularly through avoided CO₂ emissions (see Section 3.2.1).

A further example of the net benefits of forest conservation is given in the box below.

Costs and Benefits of Protecting the Mbaracayu Forest Biosphere Reserve, Paraguay

Ecosystem service values for the Mbaracayu Forest Biosphere Reserve (approximately 3,000 sq. km.) in eastern Paraguay were assessed using a forest cover map of the biosphere reserve (Naidoo et al. 2006). Six forest cover types were mapped using landsat imagery and ground data. Five ecosystem services were valued. For bushmeat, the economic value was mapped by integrating biological information on important game species, forest type classes of the Biosphere Reserve, and prices of domesticated meat in the region's primary market town. For sustainable timber harvests, data from research on standing marketable timber from various species in the Reserve were used. The calculated average per-tree value was US\$6.87. For bioprospecting, a value transfer of previous data assessing the WTP of pharmaceutical companies for the potential of tropical forests to contain precursors to new marketable drugs was used. For existence value, data from a synthesis of global economic values of forest ecosystems were used. A household WTP of US\$5/ha/annum for existence value was adopted. Carbon storage was valued based on the value of avoided emissions of carbon that is currently stored in aboveground biomass. Benefits transfer was used for services where site-specific valuation information did not exist. A zero opportunity cost was adopted for the core of the Biosphere Reserve.

Spatially explicit estimates of opportunity costs of conservation per hectare of forest were calculated as the probability that a given parcel would be converted from forest to an agricultural land-use type, multiplied by the expected net benefits from that land-use type, and then summed over all land uses. Conversion probabilities were estimated based on past patterns of forest conversion to known agricultural land uses. Net economic benefits of the various types of land uses were derived from regional estimates.

The opportunity costs of conservation in the Mbaracayu Forest Biosphere Reserve varied from US\$0 to US\$927 per hectare or an average of about US\$60/ha. Variation was related to a number of factors such as land tenure, slope and soil type. The economic values (NPV in US\$/ha) associated with five forest ecosystem services across the Reserve ranged from US\$2/ha to US\$1,045/ha. By type of service, the average economic values were as follows: carbon storage - US\$378; sustainable timber harvest - US\$27.60; existence value - US\$25; bushmeat - US\$15.59; and bioprospecting - US\$2.21.

Whether a particular forested area passed a spatial cost-benefit test for conservation was dependent on how many of the five ecosystem services were included. When considering only ecosystem services that were the most local or private in nature (i.e., bushmeat, timber, and bioprospecting for pharmaceutical products), only forests in the core protected area and indigenous reserves had benefits that exceeded opportunity costs. After existence value was added, 19% of forests outside of the core protected area would pass a cost-benefit test, but most of these still lie in indigenous reserves. Finally, when carbon values were added to the local services, ecosystem service values of virtually all forests (98%) exceeded the opportunity costs of conserving them.

The study also assessed the costs and benefits of three potential corridors for improving connectivity to the core protected area in the landscape. When all five ecosystem services were considered,

benefits of all three corridors greatly exceeded costs (Table 8.1). When only services accruing locally were considered, however, benefits were less than opportunity costs for all corridors. The results also showed that the cost benefit ratios varied for the three different corridors, especially because of variations in the estimated costs.

Source: Naidoo et al. (2006)

Table 8.1 Comparison of the Costs and Benefits of Three Hypothetical Corridors Connecting the Core Protected Area of the Mbaracayu Forest Biosphere Reserve with the Large Indigenous Reserve to the West (2005 US\$)*

	Benefits: All	Costs	All Benefits – Cost	Benefits: Local	Local Benefits – Costs
Corridor 1 (FA** - 1,182 Ha)	1,784,010	115,175	1,668,835	25,220	-89,955
Corridor 2 (FA - 874 Ha)	1,594,440	84,531	1,509,909	22,486	-62,045
Corridor 3 (FA - 1,139 Ha)	1,484,940	37,153	1,447,787	28,153	-9,000

Notes:
* Cost and benefit figures are net present values using a 20% discount rate
** FA - forest area

Source: Naidoo et al. (2006)

8.2 Comparisons of benefits estimates (Section 3) and Resource Needs (Section 5)

Direct comparisons of the costs and benefits of meeting the Aichi Targets are problematic, because of gaps in the evidence, particularly matching the costs and benefits of particular Targets and actions on a consistent basis.

However, evidence in Section 3 suggests that the value of services delivered by the most important ecosystems in the region such as mangroves, tropical forests and wetlands are likely to amount to many hundreds of billions of dollars per year. The costs of securing these services have not been estimated at regional scale, but are likely to amount to tens of billions of dollars annually. This suggests that ecosystem conservation in the region is likely to deliver net benefits, and supports the conclusions of global studies examining the costs and benefits of conservation action.

9 Conclusions

9.1 Benefits

- The evidence demonstrates the substantial value of the range of services delivered by the regions ecosystems, which help to maintain production of food and fibre, deliver vital regulating services at the global and local level, support tourism and recreation and deliver other unmarketed cultural services.
- A range of qualitative, quantitative and monetary assessments of benefits were found, for different ecosystems and at different spatial scales.
- However, the evidence is somewhat fragmented. Few estimates are available at country or regional level, and it is necessary to piece together evidence from a range of sources in order to understand the benefits of meeting the Targets across the region.
- The strongest evidence is available for particular Targets, especially those relating to the conservation and restoration of forests, wetlands, mangroves and coral reefs.
- There is strong evidence of the immense value of the services provided by the region's forests, especially through their role in regulating the global climate. Aichi Targets 5, 7, 11, 14 and 15 have an important role to play in maintaining these benefits.
- There is evidence of the need for urgent action to improve the sustainability of the region's fisheries, and the substantial benefits of delivering Aichi target 6.
- The benefits of biodiversity conservation are strongest for low-income local communities due to their dependence on ecosystem services.
- Ecosystem services offer multiple benefits to a range of different stakeholders, and increasing recognition of the value of these services is providing new potential sources of revenues to invest in biodiversity conservation, including through private sector participation in PES schemes.

9.2 Investment needs

- A recent regional workshop reviewing progress towards the Aichi targets in the LAC region provides some useful insights into overall investment needs.
- This found that countries have made strong progress in the achievement of some Targets (e.g. 11 – protected areas; 12 - species conservation) 17 - NBSAPs, 18 - traditional knowledge and 19 - science and technology).
- Countries have indicated a low level of achievement for targets 3 (incentives), 6 (sustainable fisheries), 9 (invasive species), 10 (preservation of coral reefs), 13 (genetic diversity), and 14 and 15 (ecosystem restoration. This suggests that greatest efforts need to be devoted to these areas. This has implications for investment needs, but low levels of progress also reflect other challenges such as political barriers.
- The evidence reviewed indicates that a priority in many countries is to create the enabling conditions and institutional frameworks to achieve the Aichi targets. These include development of appropriate governance and legal frameworks, incentive mechanisms, capacity and knowledge on which biodiversity action depends.
- Priorities differ across the sub-regions. In the Caribbean region, a high priority relates to the conservation of marine and coastal environments.
- In Central America and South America, a key priority is to develop sustainable financing mechanism to respond to multiple objectives (protected areas and sustainable agriculture, afforestation, reforestation and forest restoration).
- The Aichi targets are interrelated and effective implementation will depend on timing and sequencing of actions to achieve optimal effect. In particular, investments in capacity building and appropriate institutional and policy frameworks will be important in delivering

Aichi Targets 1-4 and 17-20 and in creating the conditions needed to deliver all other targets.

9.3 Resource needs

- In order to assess resource needs, we have analysed the current financing allocations in the region, sources of funding and available evidence of the resources needed to achieve the Aichi targets.
- We only find evidence available on actions related to protected areas or areas which need to be covered to protect species and key ecosystems. These actions are related to Aichi targets 11(protected areas), 12(species conservation), 10 (preservation of coral reefs) and 3 (incentive measures).
- The total annual conservation expenditures in the Latin American & the Caribbean region have been estimated to amount to an average of **US\$632 million per year** (2001-2008), from which **US\$ 203 million were allocated to Central America, US\$ 395 million allocated to South America** and approximately **US\$ 33 million to the Caribbean countries**.
- Most funding for biodiversity in Central America comes from international donors and bilateral cooperation. However, domestic resources account for the majority of funding in South America and the Caribbean.
- The total current funding for protected areas **was estimated to amount to approximately to US\$239million per year in South America, US\$141 million per year in Central America and \$54 million per year in the Caribbean**.
- There are significant funding gaps. For protected areas alone, it is estimated that funding will need to **increase by 2 to 3.2 times** on current levels in South America to meet identified needs, and by **1.5 to 2.3 times in Central America**.
- Since countries in the region estimate that their progress towards Aichi Target 11 (protected areas) is ahead of that for other targets, the funding gap for other Targets may be greater than for Target 11.
- The resource needs have to be considered above the current financial allocations. The current allocations have not halted the continuous degradation of biodiversity in protected areas which makes necessary additional resources to reach optimal management.
- Resource requirements increase significantly if other activities, where progress has so far been limited, are considered (e.g. restoration of key ecosystems – Aichi Targets 14 and 15).
- The main sources of financial resources are government spending, international cooperation and fees from users. In some countries, the level of national investment is too low compared to other sources of funding. International funding can be more effective in those areas where the enabling conditions allow for progress in conservation activities, or where funds can be directed to areas that create those institutional frameworks.
- Though detailed quantitative evidence is limited, the findings largely support those of the High Level Panel's report to COP11.

9.4 Policy Alignment and Development

- There is a strong connection between environmental degradation and the social economic conditions facing local populations.
- Providing secure and safe environmental conditions, and maintaining the delivery of key ecosystem services, contributes to the people's livelihoods and to development outcomes.
- Most of biodiversity conservation challenges in the Region are strongly related to poverty alleviation.

- Examples are given of biodiversity conservation initiatives that jointly deliver the Aichi Targets and positive development outcomes.
- Synergies and overlaps with other policy agendas mean that mainstreaming of biodiversity objectives is important, and this has implications for awareness, governance, capacity and co-ordination of delivery.

9.5 Cost Effectiveness

- Regional examples demonstrate that maintaining ecosystems and their services can save costs compared to allowing them to decline;
- The way that the targets are delivered – and the sequencing of overall delivery – will have an important influence on their overall costs.

9.6 Costs and Benefits

- Little evidence was found that directly assessed the costs and benefits of achieving one or more Aichi targets. However, some studies provide evidence that the benefits of relevant investments in biodiversity and ecosystems can exceed the costs.
- The strongest evidence that the benefits of conservation exceed the costs relates to forest conservation, where studies have shown that the net benefits of conservation through REDD+ and other PES schemes widely exceed the opportunity costs, particularly through avoided CO2 emissions.
- Services delivered by the most important ecosystems in the region such as mangroves, tropical forests and wetlands are likely to amount to many hundreds of billions of dollars per year. The costs of securing these services have not been estimated at regional scale, but are likely to amount to tens of billions of dollars annually.
- This suggests that ecosystem conservation in the region is likely to deliver net benefits, and supports the conclusions of global studies examining the costs and benefits of conservation action.

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