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Item 6 (b) of the provisional agenda*

Regional and subregional assessments of biodiversity and ecosystem services: regional and subregional assessment for the Americas

Summary for policymakers of the regional and subregional assessment of biodiversity and ecosystem services for the Americas

Note by the secretariat

1. In decision IPBES-3/1, section III, paragraph 2, the Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) approved the undertaking of four regional and subregional assessments of biodiversity and ecosystem services, for Africa, the Americas, Asia and the Pacific, and Europe and Central Asia (hereinafter called regional assessments), in accordance with the procedures for the preparation of the Platform's deliverables set out in annex I to decision IPBES-3/3, the generic scoping report for the regional and subregional assessments of biodiversity and ecosystem services set out in annex III to decision IPBES-3/1, and the scoping reports for each of the four regional assessments (decision IPBES-3/1, annexes IV–VII).

2. In response to the decision, a set of six individual chapters and their executive summaries and a summary for policymakers were produced for each of the regional assessments by an expert group in accordance with the procedures for the preparation of the Platform's deliverables.

3. The annex to the present note sets out the summary for policymakers of the regional and subregional assessment for the Americas (deliverable 2 (b)), which is underpinned by the six individual chapters and their executive summaries (IPBES/6/INF/4). At its sixth session, the Plenary will be invited to approve the summary for policymakers. It will be also invited to accept the chapters of the assessment, which will be revised following the sixth session to ensure consistency with the summary for policymakers as approved.

* IPBES/6/1.

Annex

Summary for policymakers of the regional assessment report on biodiversity and ecosystem services for the Americas of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

Authors:

Jake Rice (co-chair, Canada), Cristiana Simão Seixas (co-chair, Brazil), María Elena Zaccagnini (co-chair, Argentina);

Mauricio Bedoya-Gaitán (IPBES), Natalia Valderrama (IPBES); Christopher B. Anderson (Argentina/United States of America), Mary T. K. Arroyo (Chile/New Zealand), Mercedes Bustamante (Brazil), Jeannine Cavender-Bares (United States), Antonio Diaz-de-León (Mexico), Siobhan Fennessy (United States), Jaime Ricardo García Marquez (Colombia/Germany), Keisha Garcia (Trinidad and Tobago), Eileen H. Helmer (United States), Bernal Herrera (Costa Rica), Brian Klatt (United States), Jean P. Ometo (Brazil), Vanesa Rodriguez Osuna (Bolivia/United States), Fabio R. Scarano (Brazil), Steven Schill (United States) and Juliana Sampaio Farinaci (Brazil).[1]

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Members of the management committee who provided guidance for the production of this assessment:

Brigitte Baptiste, Floyd Homer, Carlos Joly, Rodrigo Medellin (Multidisciplinary Expert Panel), Diego Pacheco, Spencer Thomas, Robert Watson (Bureau).

[1] Authors are listed with, in parenthesis, their country of citizenship, or countries of citizenship separated by a comma when they have several; and, following a slash, their country of affiliation, if different from citizenship, or their organization if they belong to an international organization: name of expert (nationality 1, nationality 2/affiliation). The countries or organizations having nominated these experts are listed on the IPBES website.

Key messages

A. Nature's contributions to people and quality of life[2]

A1. The Americas are endowed with much greater capacity for nature to contribute to people's quality of life than the global average. The Americas contain 40 per cent of the world ecosystems' capacity to produce nature-based materials consumed by people and to assimilate by-products from their consumption, but only 13 per cent of the total global human population. Such capacity results in three times more resources provided by nature per capita in the Americas than are available to an average global citizen. Those resources contribute in essential ways to food security, water security and energy security, as well as to providing non-material contributions such as pollination, climate regulation and air quality, physical and mental health, and cultural continuity.

A2. The economic value of terrestrial nature's contributions to people in the Americas is $24.3 trillion per year, equivalent to the region's gross domestic product. The countries with the greatest land area account for the largest values, while some island-states account for the highest values per hectare per year. Such differences occur partly because the monetary value of specific ecosystem types varies, with units of analysis (Figure SPM.2) like coastal areas and rainforests having particularly high economic values. Difficulties in valuation of non-market nature's contributions to people make comparative evaluations among subregions or units of analysis inconclusive.

A3. The cultural diversity of indigenous people and local communities in the Americas provides a plethora of knowledge and world views for managing biodiversity and nature's contributions to people in a manner consistent with cultural values promoting the respectful interaction of people with nature. Major indigenous and local knowledge systems in the region have shown their capacity to protect and manage the territories under their particular set of values, technologies and practices, even in a conflicting process of globalization. In addition, the many cultures that immigrated to the Americas over the past five centuries contribute to the diversity of values. This collective diversity provides many opportunities to develop world views compatible with sustainable uses of and respect for nature in a globalized world.

A4. Many aspects of quality of life are improving at regional and subregional scales. However, this comes at the cost of the majority of countries in the Americas using nature more intensively than the global average and exceeding nature's ability to renew the contributions it makes to quality of life. The 13 per cent of the global human population residing in the Americas produces 22.8 per cent of the global ecological footprint, with North America accounting for 63 per cent of that proportion. Moreover, the distribution of benefits from the use of many of nature's contributions to people is uneven among people and cultures in the Americas, such that nature-based securities face threats or show declines.

A5. Food security: Agricultural production, fisheries and aquaculture continue to increase the provision of food for the region and the planet, but at the expense of other important aspects of nature's contributions to people. **Extensification and intensification to increase food production are causing, respectively, the replacement and degradation of natural ecosystems that provide multiple material, non-material and regulating nature's contributions to people, sustain many livelihoods and contribute to many aspects of quality of life, with less diverse systems producing fewer of nature's contributions to people and supporting fewer livelihoods.** Small-scale fisheries, agriculture, livestock husbandry and agroforestry practiced by indigenous people and local communities reflect diversification of sustainable uses of nature and play major roles for food security and health at the local level. Agricultural production builds on a foundation of the biodiverse American tropics and montane regions, which are centres of origin for many domesticated plants, including globally important crops and commodities.

A6. Water security: The Americas are rich in freshwater resources; however, water supply varies widely across subregions and is declining per capita, and there is widespread unsustainable groundwater extraction throughout the region. Moreover, trends in water quality are decreasing in most watersheds and coastal areas, and dependence on infrastructure for water provisioning is increasing. Despite abundance, freshwater supplies can be locally scarce. This uneven availability, combined with inadequate distribution and waste treatment infrastructure, make water security a problem for over half the population of the Americas, reducing reliable access to a sufficient quality and quantity of fresh water, with impacts on human health.

[2] See appendix 2 for further information on the concept of nature's contributions to people.

A7. Energy security: Energy from nature-based sources, including cultivated biofuels and hydropower, has increased in all the subregions of the Americas. Nevertheless, at the local level, bioenergy production may compete with food production and natural vegetation and may have consequences for different components of biodiversity and livelihood. Increases in hydropower production alter watersheds, with consequences for aquatic biodiversity, displacement of people, and alternative uses of land that is inundated or otherwise altered and for uses of water needed by hydropower facilities.

A8. Health: The peoples of the Americas have benefited from the availability of food, water, pharmacological products and interaction with nature for their physical and mental health; nevertheless, many challenges for health improvement remain. Nutritionally, food insecurity has largely been overcome during the last decades, yet over 40 million people remain undernourished in Latin America and 3.6 million face severe food insecurity in North America. Pharmacological products from biodiversity and chemodiversity hold potential for the development of new products with high economic value. Experience with nature contributes to physical and mental health. In tropical areas, land-use changes, particularly deforestation, mining and reservoirs, are among the main causes of outbreaks of infectious human diseases and emergence of new pathogens. Diarrhea from contaminated water and poor sanitation accounts for over 8,000 deaths per year for children under age five.

A9. Cultural continuity: Indigenous people and local communities have created a diversity of polyculture and agroforestry systems, which has provided livelihoods, food and health and, through diversification processes, increased biodiversity and shaped landscapes. On the other hand, the decoupling of lifestyles from local habitats and direct degradation of the environment erode sense of place, language and local ecological knowledge, compromising cultural continuity. For example, 61 per cent of the languages in the Americas, and the cultures associated with them, are in trouble or dying out.

B. Trends in biodiversity and nature's contributions to people affecting quality of life

B1. Threats to or declines in the nature-based securities reflect ongoing reduction of nature's ability to contribute to human well-being. In the Americas, 65 per cent of nature's contributions to people in all units of analysis (Figure SPM.2) are declining, with 21 per cent declining strongly. Compared to pre-European settlement status, over 95 per cent of grasslands in North America; 72 per cent and 66 per cent of tropical dry forest in Mesoamerica and the Caribbean, respectively; and 88 per cent of the Atlantic tropical forest, 70 per cent of the Rio de la Plata grasslands, 50 per cent of the tropical savanna (Cerrado), 50 per cent of the Mediterranean forest, 34 per cent of the Dry Chaco and 17 per cent of the Amazon forest in South America have been transformed into human-dominated landscapes. Nevertheless, a few biomes are increasing in response to climate change, or recovering from historical disturbances that have ceased. On local scales, restoration initiatives are improving habitats, with greater biodiversity and a wider range of nature's contributions to people, but such areas represent a small proportion of the lands and waters of the Americas.

B2. The risk of populations or species threatened with loss or extinction is also increasing. More than a quarter of the 14,000 species assessed by the International Union for Conservation of Nature in the Americas are classed as being at a high risk of extinction.

C. Drivers of trends in biodiversity and nature's contributions to people

C1. The most important indirect anthropogenic drivers of changes in nature, nature's contributions to people and quality of life include population and demographic trends, unsustainable patterns of economic growth, weaknesses in the governance systems and inequity. Economic growth and trade can positively or negatively affect biodiversity and nature's contributions to people. Currently, on balance, they have an adverse impact, because environmental and social development goals are insufficiently accounted for. The sixfold increase in gross domestic product since 1960 has improved many people's quality of life in a growing population with increasing wealth and accompanying greater demand for food, water and energy. However, meeting these demands has increased pressures on natural resources, with negative consequences for nature, many regulating and non-material nature's contributions to people, and quality of life of many other people.

C2. Weaknesses in the governance systems and institutional frameworks have had adverse implications for nature, nature's contributions to people and quality of life in the Americas, and decoupling of environmental, social and economic policies remains common. Over past decades, significant broadening of governance has occurred, with inclusion of additional actors and new hybrid governance modes in line with the rising role of markets in environmental governance. Also, the

diverse value systems in the Americas shape governance systems, in particular the ways of addressing development policies, land tenure and indigenous rights, and influence decisions on land use and natural resources exploitation. Indigenous peoples and local communities throughout the Americas have developed many different socioeconomic systems (nationally and locally), and their knowledge may positively influence uses of biodiversity and ecosystem services. On the other hand, failures in democratic decision-making and inclusive and effective public participation; lack of respect for rule of law, community-based practices and customs, and human rights; lack of acknowledgement of pluralism; the presence of corruption; and unregulated market forces can all contribute to ineffective governance and thereby to poverty and inequity in both access to and distribution of benefits from the use of nature's contributions to people.

C3. Habitat conversion, fragmentation, and overexploitation/overharvesting are the greatest direct drivers of loss of biodiversity, loss of ecosystem functions, and decrease of nature's contributions to people from local to regional scales in all biomes. Habitat degradation due to land conversion and agricultural intensification; wetland drainage and conversion; urbanization and other new infrastructure; and resource extraction are the largest direct threats to nature's contributions to people and biodiversity in the Americas. Intensified, high-input agricultural production contributes to food and energy security, but has introduced elevated nutrient loading, pesticide residues and other agro-chemicals into ecosystems, threatening water security, biodiversity and health in all subregions. The resulting changes in terrestrial, freshwater and marine environments are interrelated and often lead to changes in biogeochemical cycles, pollution and eutrophication of ecosystems, and biological invasions.

C4. Human induced climate change is becoming an increasingly important direct driver, amplifying the impacts of other drivers (i.e. habitat degradation, pollution, invasive species and overexploitation) through changes in temperature, precipitation and frequency of extreme events and other variables. The majority of ecosystems in the Americas have already experienced increased mean and extreme temperatures and/or precipitation causing changes in species distributions and interactions, in ecosystem boundaries and loss of cryosphere. The impacts of climate change on nature, nature's contributions to people and quality of life are locally specific.

C5. The combustion of fossil fuels is a major source of the pollution adversely impacting most terrestrial and marine ecosystems. Air pollution causes significant adverse effects on biodiversity. Ocean acidification from increased atmospheric carbon dioxide is increasing, affecting major components of the Pacific Ocean food web and contributing to a Caribbean-wide flattening of coral reefs.

D. Future trends in biodiversity and nature's contributions to people and the global commitments

D1. Key drivers of trends in biodiversity and nature's contributions to people are expected to intensify into the future, increasing the need for improved policy and governance effectiveness.

- By 2050 the population of the Americas is projected to increase by 20 per cent to 1.2 billion and the gross domestic product to nearly double, with concomitant increases in consumption.
- Unsustainable agricultural practices and climate change are projected to be major drivers of further degradation of most terrestrial ecosystems.
- Multiple drivers are projected to intensify and interact, often in synergistic ways, further increasing biodiversity loss, reducing ecosystems' resilience and the provision of present levels of nature's contributions to people.

D2. Pressure on nature is predicted to increase more slowly, or even be reduced in some subregions, under the transition pathways to sustainability scenarios by 2050, while it is expected to increase under the business-as-usual scenario. Comparison of the global technology, decentralized solutions and consumption change pathway shows that the consumption change pathway could lead to the maintenance of a larger expanse of natural areas in North and South America, whereas the global technology pathway is expected to maintain more natural areas in Central America and the Caribbean. All three pathways project a reduction of biodiversity loss in all the subregions compared to the increased loss anticipated under the business-as-usual scenario.

D3. For most countries, global environmental commitments are uncoupled from national policies. For example, biodiversity and nature's contributions to people are diminishing, despite the awareness raised by the Millennium Ecosystem Assessment 12 years ago and the almost universal endorsement of the Aichi Biodiversity Targets, the Sustainable Development Goals, and the Paris Agreement. If present trends in habitat degradation and biodiversity loss continue, the

Aichi Targets and the Sustainable Development Goals will not be met in any of the subregions, and only in a few cases will individual countries meet them.

E. Management and policy options

E1. Although most ecosystems in the Americas continue to be degraded, there are initiatives that are slowing and often reversing this trend.

- **An increase in protected areas by most countries is contributing to maintaining options for the future.** Protection of key biodiversity areas increased 17 per cent from 1970 to 2010, yet fewer than 20 per cent of key biodiversity areas are protected**.** Coverage of marine protected areas is much smaller than for their terrestrial counterparts in South and Mesoamerica, while in the Caribbean and North America it is slightly larger. Where frontier areas still exist, the recognition of indigenous land has proven a powerful instrument for protecting nature.

- **Ecological restoration projects have been implemented at local scales in different units of analysis in all subregions**. **Although ecological restoration can speed up ecosystem recovery, initial costs can be significant, full reversal of degradation is unlikely, and non-material contributions may not be restored for some people.**

- **Protected and restored areas will always comprise a minority of the area of land and sea, so sustainability of uses outside such areas will remain a priority**. Diverse, more integrative strategies, from the holistic approaches of many indigenous peoples to the ecosystem-based approaches developed for sectorial management, have all been effective when appropriately implemented. Strategies for making human-dominated landscapes (e.g., agricultural landscapes and cities) supportive of biodiversity and nature's contributions to people (e.g., multifunctional, diversified landscapes and agro-ecological systems) are essential if biodiversity and nature's contributions to people are to be protected and enhanced where they have been degraded.

E2. Policy interventions can be more effective when they take into account causal interactions between distant places (i.e., telecoupling) and leakage and spillover effects at many levels and scales across the region. Additionally, the causes of many threats to biodiversity and nature's contributions to people are inherently beyond national borders and must be addressed through bilateral and multilateral agreements.

E3. Most countries in the Americas deal with the environment as a separate sector in national planning, rarely mainstreaming it effectively into economic and social development sectors. Mechanisms for integrating biodiversity policies into agencies with jurisdiction over pressures on biodiversity would promote better policies. Policies and measures must be coherent and integrated across sectors if they are to achieve their desired outcomes. A broad array of policy instruments, such as payment for ecosystem services, rights-based instruments and eco-certification, can be used by a range of actors to better mainstream biodiversity and nature's contributions to people into policy and management.

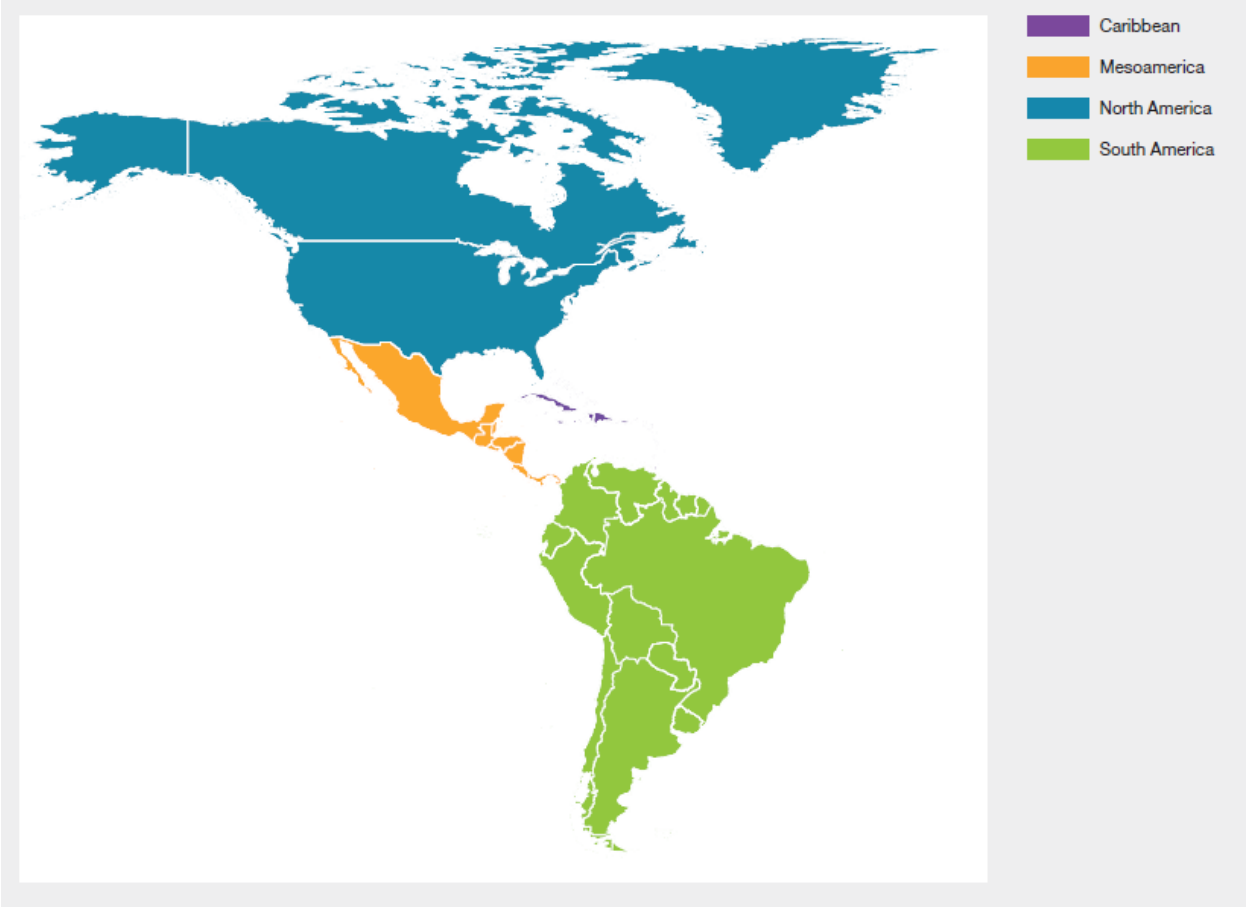
E4. Although ineffective governance undermines biodiversity and nature's contributions to people, there is no single governance approach or set of approaches that will effectively address all the challenges being faced in the management of biodiversity and nature's contributions to people. Mixed governance systems and modes have provided both successes and failures across subregions. Partnerships and participatory deliberative processes, recognition of the rights of indigenous peoples and disadvantaged groups, more equitable access to nature's contributions to people and adherence to the principle of subsidiarity have all often performed effectively when well implemented. Policy implementation can also be facilitated when policies are perceived as presenting opportunities for stakeholders, not just imposing limitations on choices. The effectiveness of participatory processes can be improved by building the capacity of all stakeholder groups to engage in governance processes and providing equal access to information relevant to the governance dialogue.

E5. Although development and adoption of policies are important, there are other factors, including behavioural change, that must be addressed for effective biodiversity conservation and provision and maintenance of nature's contributions to people. Effective implementation of public policies requires appropriate combinations of behavioural changes, improved technologies, innovation, effective governance arrangements, education and public awareness programs, scientific research, monitoring and evaluation, adequate finance arrangements, supporting documentation and capacity building. The required behavioural changes may be needed from individuals, communities, business and governments.

Background

The Americas region (Figure SPM.1) is highly biologically diverse, hosts seven out of the 17 most biodiverse countries of the world and encompasses 14 units of analysis (Figure SPM.2) across 140 degrees of latitude (*well established*)[3] {1.1, 1.6.1}. The Americas include 55 of the 195 terrestrial and freshwater world ecoregions with highly distinctive or irreplaceable species composition. The region hosts 20 per cent of globally identified key biodiversity areas, 26 per cent of globally identified terrestrial biodiversity conservation hotspots and three of the six longest coral reefs. In addition, the Gulf of California and Western Caribbean are included in the top 18 key marine biodiversity conservation hotspots {1.1, 3.2}. The region has some of the most extensive wilderness areas on the planet, such as the Pacific Northwest, the Amazon and Patagonia. The Páramo and Amazonian forests, respectively, are the richest tropical alpine area and tropical wet forests in the world (*well established*) {3.4.1.1, 3.4.1.5}. Around 29 per cent of the world´s seed plants, 35 per cent of mammals, 35 per cent of reptiles, 41 per cent of birds and 51 per cent of amphibians are found in the Americas, summing to over 122,000 species for those species groups alone (*established but incomplete*) {3.2.2.2; Table 3.1}, in addition to over one third of the world´s freshwater fish fauna, consisting of over 5,000 species (*well established*) {3.2.3.1; Table 3.1}. Conservatively, 33 per cent of the plants used by humans are found in the Americas (*well established*) {3.2.2.2}.

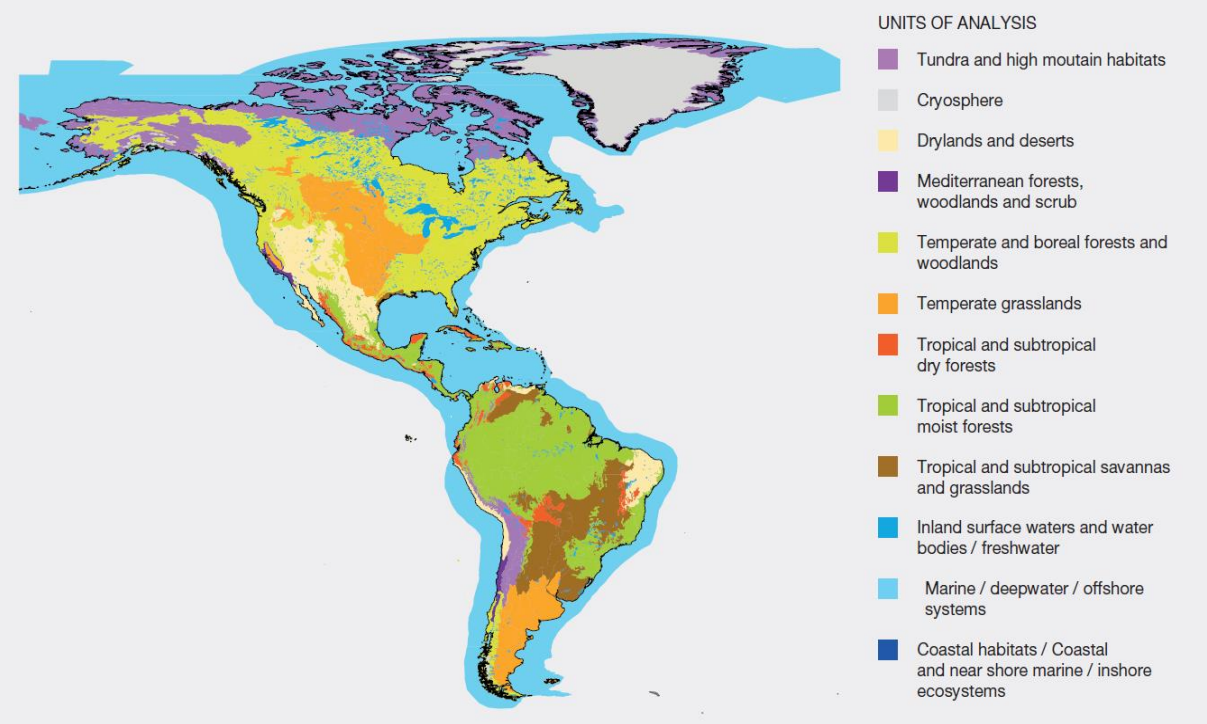
Figure SPM.1
Subregions of the Americas assessment



Source: Adapted from a map available from Natural Earth, http://www.naturalearthdata.com/.

[3] For an explanation on the degree of confidence, please see appendix 1.

Figure SPM.2
Units of analysis of the Americas assessment



Source: Adapted from Olson et al., 2001, World Wildlife Fund, 2004 and 2012, and Marine Regions, 2016.[4]

The Americas is a highly culturally and socioeconomically diverse region *(well established)*. It is populated by an exceptionally large proportion of new immigrants and descendants of immigrants from all parts of Europe, Asia and Africa, in addition to over 66 million indigenous people whose cultures have persisted in all subregions despite persecution, access restriction to, and expropriation from their lands in most countries (*established but incomplete*) {2.1.1, 2.1.2, 2.3.5, 2.5}. The Americas is home to 15 per cent of global languages {2.1.1}. The human population density in the Americas ranges from 2 per 100 km^2 in Greenland to over 9,000 per km^2 in several urban centres {1.6.3}. Socioeconomically, the region contains 2 of the 10 countries with the highest Human Development Index, as well as 1 of the 30 countries with the lowest Human Development Index (*well established*) {1.6.3}. Such heterogeneity makes it difficult to develop general conclusions that apply uniformly across all subregions.

A. Nature's contributions to people and quality of life

Although the high biocapacity of the Americas means that nature has an exceptional ability to contribute to people's quality of life (*well established*) {2.6; Table 2.24}, the links between biocapacity and the real availability of individual nature's contributions to people are not fully established (see appendix 2). The relatively high average per capita availability of resources does not ensure their equitable availability nor prevent resource shortages at a given time or place or within a given socioeconomic stratum {2.5, 2.6; Figure 2.36; Table 2.24}.

[4] Olson, D. M., E. Dinerstein, E.D. Wikramanayake, N.D. Burgess, G.V. Powell, E.C. Underwood, J.A. D'Amico, I. Itoua, H.E. Strand, & J.C. Morrison (2001). Terrestrial Ecoregions of the World: A New Map of Life on Earth: A new global map of terrestrial ecoregions provides an innovative tool for conserving biodiversity. BioScience, 51, 933-938. https://doi.org/10.1641/0006-3568(2001)051[0933:TEOTWA]2.0.CO;2.

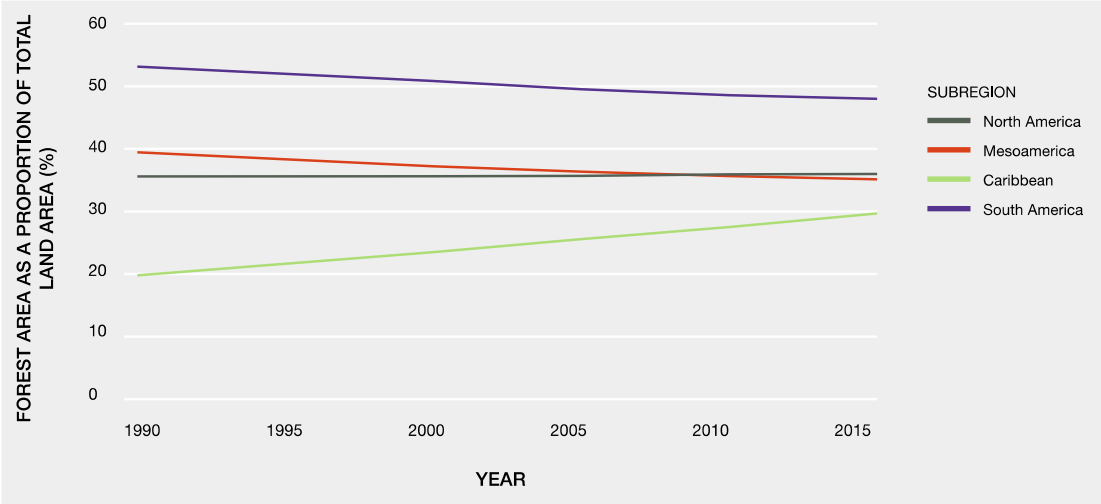
World Wildlife Fund (2004). Global Lakes and Wetlands Database. Retrieved from https://www.worldwildlife.org/pages/global-lakes-and-wetlands-database.

World Wildlife Fund (2012) Terrestrial Ecoregions of the World. Retrieved from https://www.worldwildlife.org/publications/terrestrial-ecoregions-of-the-world.

Marine Regions (2016). Marine Regions. Retrieved from http://www.marineregions.org.

The disproportionate and unsustainable use of biocapacity by the population of the Americas has increased steadily in recent decades (*well established*) {2.6; Table 2.25}. Since the 1960s, renewable fresh water available per person has decreased by 50 per cent {2.6; 2.10; Figure 2.19}, land devoted to agriculture has increased by 13 per cent {4.4.1}, forest areas have continued to be lost in South America (9.5 per cent) and Central America (25 per cent) although there have been net gains in North America (0.4 per cent) and the Caribbean (43.4 per cent) {4.4.1} (Figure SPM.3), and lands converted to urbanization have increased by 3.3 per cent annually. The ecological footprint of the Americas has increased two- to threefold in each subregion since the 1960s. This trend has become attenuated in recent decades for North America, Mesoamerica and the Caribbean, but continues to increase in South America (Figure SPM.4), and the patterns vary significantly among subregions {2.6; Table 2.24} and units of analysis {4.3.2} (*well established*). In all subregions, there are cultures and lifestyles that are achieving sustainable management of natural resources toward a good quality of life. However, the aggregate footprint of all lifestyles in the Americas remains unsustainable and continues to grow (*established, but incomplete*). {2.1.1, 2.6, 5.4.11}.

Figure SPM.3
Total forest cover trends by subregions



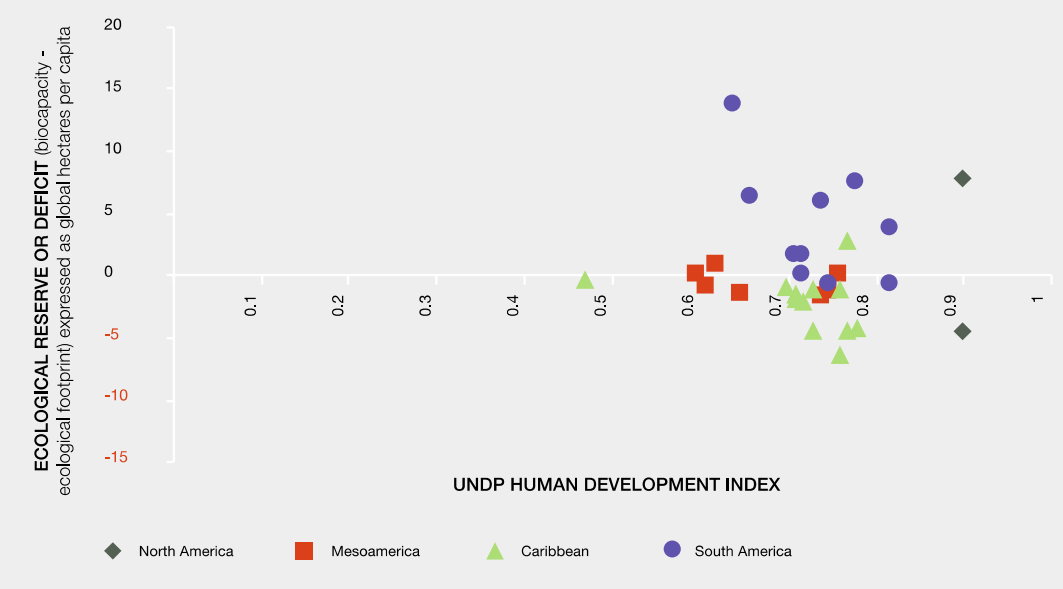
Source: Food and Agriculture Organization of the United Nations (FAO, 2015) [5]

Differences in economic development attained within and among countries of the Americas and variation in countries' ecological footprint associated with their pursuit of development pose challenges to equity and sustainable use of nature (*well established*). Social inequity in distribution of benefits from uses and access to nature's contributions to people is high and continues to be an important concern in each of the subregions (*established but incomplete*) {2.5, 4.3}. Although overall poverty rates have decreased in the last 20 years, large numbers of people, particularly in Mesoamerica, the Caribbean and South America, are still vulnerable {4.3}. The increasing human demand for food, water and energy security increases consumption and intensifies the ecological footprint of the Americas {2.3.2, 2.3.5, 4.3.2} (Figure SPM.4). This intensification has had negative consequences for nature, with adverse implications for nature's contributions to people (Figure SPM.5) and quality of life, and for availability of future options (*well established*) {2.3.5, 3.2.3, 3.3.5, 3.4, 5.5}.

[5] Food and Agriculture Organization of the United Nations (2015). *Global Forest Resources Assessment 2015*. Retrieved from www.fao.org/forest-resources-assessment/en. Visual prepared on November 21, 2017, by the IPBES task group on indicators and the technical support unit based on raw data provided by indicator holder.

Figure SPM.4a

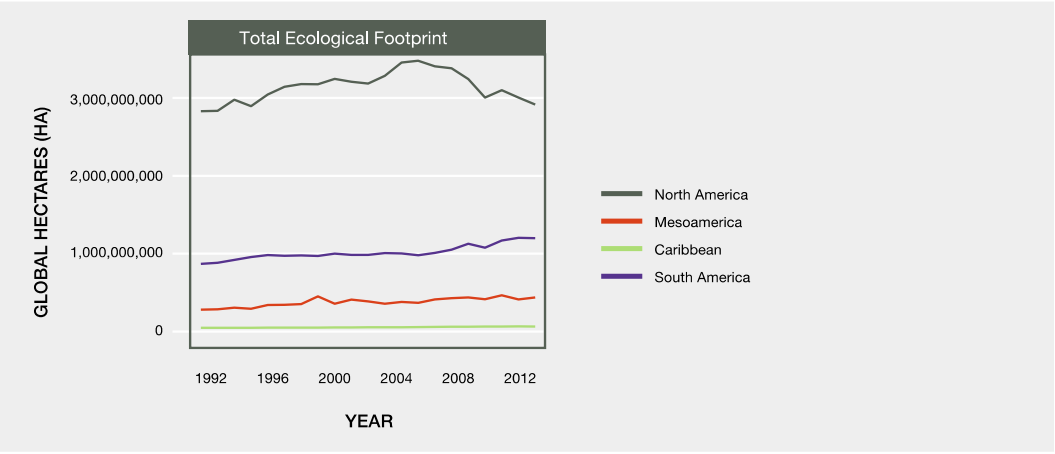
Ecological reserve or deficit (biocapacity - ecological footprint) per country in the Americas as a function of the United Nations Development Programme's 2012 Human Development Index



Source: Global Footprint Network, 2016 and World Wildlife Fund, 2016.[6]

Figure SPM.4b

Total ecological footprint per subregion in the Americas between 1992 and 2012



Source: Global Footprint Network, 2017[7]

[6] Global Footprint Network (2016). *National Footprint Accounts.* Data file, introduction and definitions. 2016 Edition. Retrieved from http://data.footprintnetwork.org/#/.

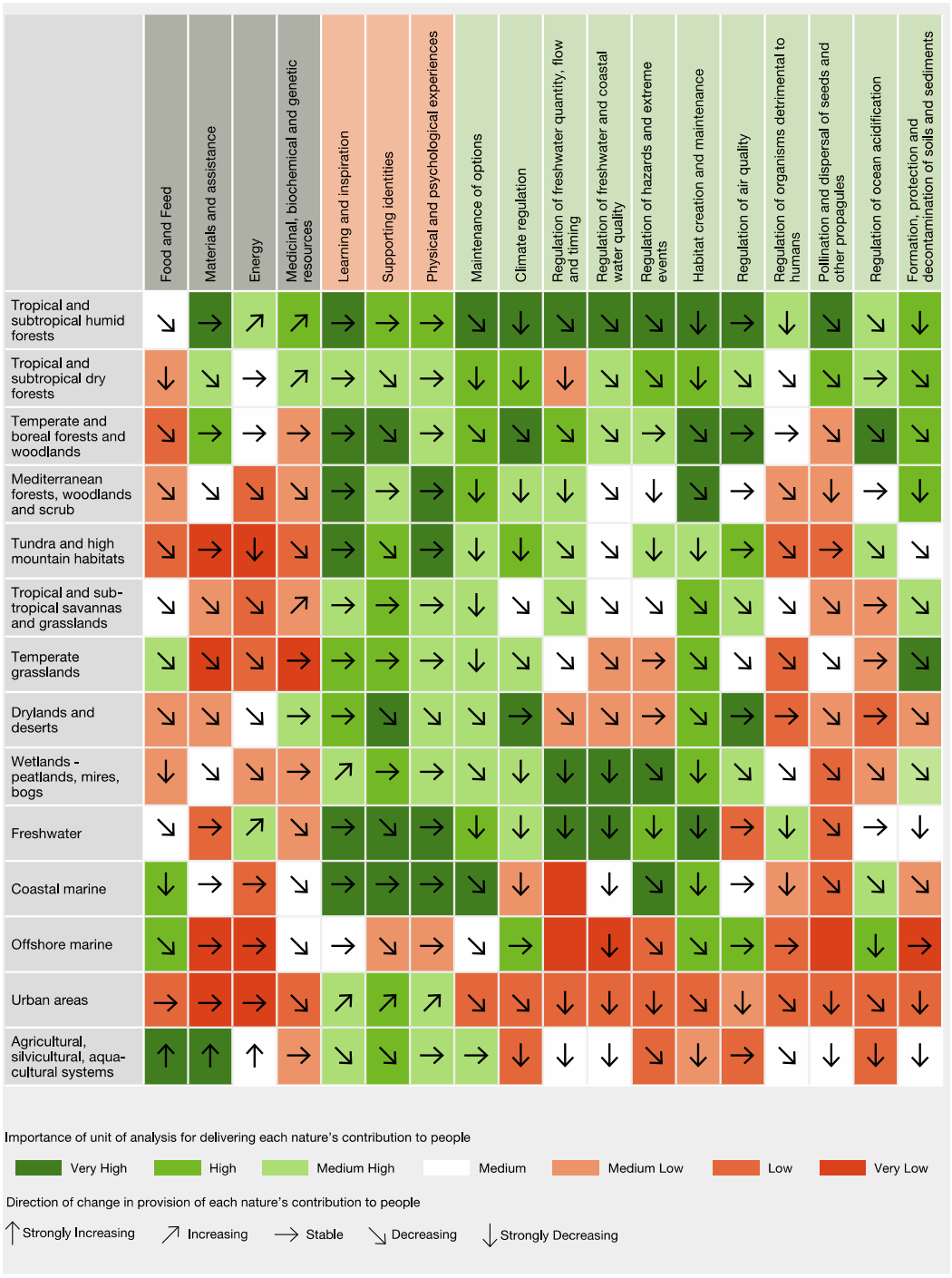
World Wildlife Fund (2016). *Living Planet Report 2016.* Risk and resilience in a new era. WWF International, Gland, Switzerland. 145 pp. http://wwf.panda.org/about_our_earth/all_publications/lpr_2016/.

Countries included: North America: Canada, United States of America; Mesoamerica: Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama; Caribbean: Antigua and Barbuda, Aruba, Bahamas, Barbados, British Virgin Islands, Cayman Islands, Cuba, Dominica, Dominican Republic, Grenada, Guadeloupe, Haiti, Jamaica, Martinique, Montserrat, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and Grenadines, Trinidad and Tobago; South America: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, French Guiana*, Guyana*, Paraguay, Peru, Suriname*, Uruguay, Venezuela (Bolivarian Republic of). Asterisks (*) indicate countries excluded from analysis in panel a.

[7] Global Footprint Network (2017). Visual prepared on 27 October 2017, by the IPBES task group on indicators and the technical support unit based on raw data provided by indicator holder.

Figure SPM.5

Trends in the provision of nature's contributions to people (grey: material; pink: non-material; green: regulating) for each unit of analysis. Trends are based on a modified Delphi process to build consensus among experts, as indicated by the literature synthesis for the assessment {chapter 2}; values from each subregion are equally weighted. Values for both importance {chapter 3} and direction of change were assigned based on the proportion of the unit of analysis that has not been converted by human activities. Squares without arrows indicate that there is no clear link between nature's contributions to people for that category and the corresponding unit of analysis.



Source: Own representation.

In the Americas, increases in the uses of nature have resulted in the region being the largest global exporter of food and one of the largest traders in bioenergy (*well established*). Agricultural and livestock production in the Americas, which is critical to providing food for both the region and the rest of the world, continues to increase {3.2.1, 3.3.5}. Crop production in the Americas more than doubled between 1961 and 2013, except in the Caribbean, due to extensification and intensification of large-scale agriculture {2.2.2.1, 2.3.5}, replacement of natural ecosystems with simpler managed systems, reduction of many types of non-food nature's contributions to people and changing of the distribution of economic benefits and livelihoods (*well established*) {2.5, 2.7}. In places throughout the Americas, indigenous people and local communities continue sustainable agricultural and hunting practices, but contribute only a small volume to the Americas share of global trade in food. All scales of agriculture have benefited from domestication of plants from tropical and montane areas of the Americas (*well established*) {1.1, 2.2.1, 2.4, 3.3.3}. Marine fish harvests have peaked in all subregions and are decreasing as stocks decline or management reduces harvest rates, while freshwater-capture fish production has increased slightly and the contribution of aquaculture grew from 3 per cent of total fish production in 1990 to 17 per cent in 2014 {4.4.5}.

In addition to export of food commodities, the Americas have a large commerce of timber and fibre from plants and animals. Although rates of timber and fibre production have increased significantly over the last several decades, they have begun to slow and are expected to continue to decrease as new technologies and production substitutes emerge and supplies of timber continue to decrease (*well established*) {2.2.2, 4.3.4, 4.4.5}.

The water security challenges for over half the population of the Americas arise from both unevenly distributed supply and access and decreasing water quality (*well established*). Supply challenges include arid lands in all subregions, provision of water to urban centres, and increasing intensive agriculture in areas with seasonal lack of rain (*well established*) {2.3.2}. Importation of water and commodities containing water from water-rich areas helps offset water scarcity in arid regions, but may reduce water quality due to environmental damage (e.g., pollution of water bodies with agrochemicals) (*established but incomplete*) {2.2.10, 2.3.2, 4.3, 4.4.2, 5.4.10}. Moreover, in all regions, natural watersheds have been insufficiently protected from land conversion to agriculture and grazing, forest harvesting and urban development practices (*established but incomplete*) {4.4.1, 4.4.5}, causing water quality to being degraded by runoff from agricultural and urban areas and inadequate sanitation (*well established*) {2.2.11, 2.3.2, 4.4.1, 4.4.2, 5.3.10}. In the Americas, approximately 23 million tonnes of nitrogen fertilizer and 22 million tonnes of phosphorus were used in 2013, with a large proportion ending up in water runoff owing to agricultural practices (*established but incomplete*) {2.3.2, 2.3.3, 4.4.1, 4.4.2}.

Energy produced from hydropower and biological fuel sources, including cultivated biofuel species, has increased in the Americas, contributing to energy security (*well established*) {2.3.3}. Both increasing trends can negatively affect biodiversity (*established but incomplete*}. Demand for bioenergy production at large scales has doubled crop prices in less than a decade and resulted in a new wave of habitat conversion to intensive agriculture in some areas {4.4.1}. In most of these areas, bioenergy production competes with food production and natural vegetation, with consequences for biodiversity and local populations that depend on the land for their livelihoods and food {4.4.1}. The increases in hydropower production have resulted in alterations in watersheds, with many consequences, both negative and positive, for aquatic biodiversity, water availability for local uses in the watershed, the quality of life of displaced people, and alternative uses of lands inundated or otherwise altered by the hydropower facilities {2.3.2, 2.3.3, 3.2.3.1, 4.3.1, 4.7}.

Biodiversity has long provided indigenous people and local communities with sources of pharmacological products (including medicinal plants and animals), and such natural sources, including high chemodiversity, hold potential for the development of new products with high economic value (*well established*) {2.2.4, 2.4}. Outside of North America, the development of medicinal products has been weak, and many opportunities remain for bio- and chemodiversity prospecting. These sources of economic development must respect international agreements such as the Convention for Biological Diversity and its protocols and national regulations, to ensure commercialization takes place with full respect of the rights of indigenous people and local communities and a low environmental impact {2.4, 6.4.3.1}.

Nutrition in the Americas still faces subregional problems of both hunger and obesity (*well established*) {2.3.1}. Undernourishment in Latin America and the Caribbean has been reduced from 14.7 per cent to 5.5 per cent in the past 20 years, although millions still face food insecurity in all subregions. Conversely, obesity has rapidly increased in all subregions over the past four decades, reaching over 30 per cent of adults in North America, and over 20 per cent in the other three subregions. Intake of energy-dense foods high in fat (often processed food, based on few crops) and an

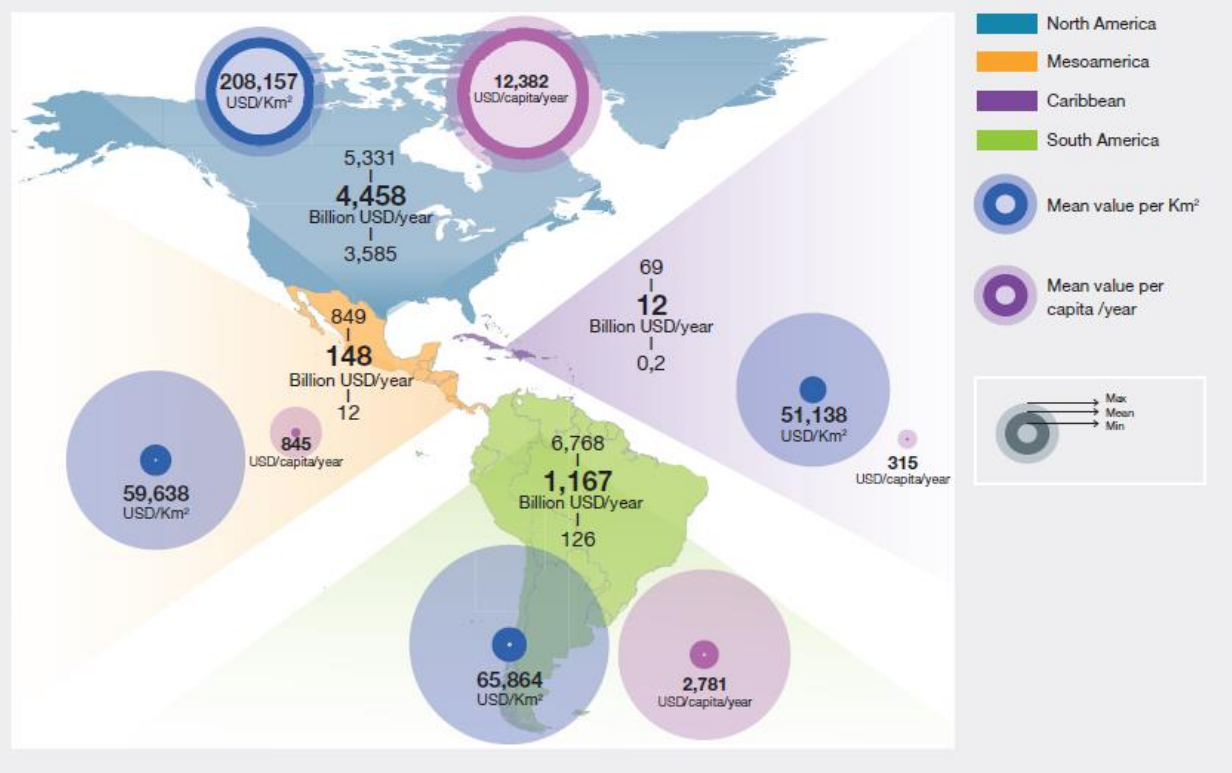
increase in physical inactivity associated with urban lifestyles and modes of transportation are the main causal factors {1.3.2, 2.3.1}. Health benefits have been well documented for diets based on diverse natural products. There is also extensive evidence that ecosystem contaminants and pollutants transferred to humans via their food supplies are highly correlated with widespread and sometimes serious health problems, such as cancer and reproductive or nervous-system disorders {4.4.2}.

Trends in livelihoods and good quality of life depend not only on material nature's contributions to people with high economic value (e.g., food, wood, fibre), but also on non-material contributions (e.g., learning and experiences, supporting identities) and regulating contributions (e.g., regulation of extreme events, disease, pollination) that are often not accounted for in economic development (***well established***) {1.3.2, 2.2.5, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.2.10, 2.2.11, 2.2.12, 2.5.1}. Mental health is strongly and positively influenced by access to nature, including urban green spaces, and such benefits are increasingly included in urban and regional planning {2.3.4, 5.4.8}. However, green spaces in urban and suburban areas are unequally distributed across the Americas and within cities (*well established*) {3.3.4}. The mechanisms by which these contributions are delivered and the ways in which the characteristics of natural settings can affect the resulting nature's contributions to people in different geographical locations, cultures and socioeconomic groups require more attention. There are many opportunities for strengthening and applying policies that take these non-material nature's contributions to people fully into account (*inconclusive*) {2.2.7}.

Comprehensively evaluating the ways that a specific nature's contribution to people supports quality of life requires taking into account the multiple values and value systems associated with that contribution (*well established*) {2.5.1; Table 2.21}. For example, as nature's contribution to people, food and feed can be evaluated relative to their biophysical metrics, including species richness and extent of land cover devoted to producing the food {2.2.1}. At the same time, this edible biodiversity is incorporated into human quality of life via health effects that can be positive (e.g., malnutrition has decreased in the last decades in the Americas, {2.3.1}) or negative (e.g., agriculture-related pollution {2.2.1, 4.4.2}). Nature's contributions to people also relates to sociocultural practices that are meaningful to humans (e.g., food-related production activities like farming, ranching, fishing and hunting; and cultural customs and sometimes requirements to fulfill dietary needs in particular ways, {2.3.1}) and constitute nature-based livelihoods. Holistic evaluations of indigenous and local knowledge are needed to understand the traditional ways that nature was managed to produce food and feed, many of which allowed for the maintenance or even enhancement of local and regional biodiversity, in contrast to modern industrial food production (*well established*) {2.2.1, 2.2.6, 2.3.5, 2.4}.

When only economic values are taken into account, subregional differences are noted (Figure SPM.6). Nature's contributions to people valued as ecosystem services per area (km^2) are threefold higher in North America than in the rest of the region, and differences when expressed per capita are even larger. Brazil, United States of America and Canada had the largest total monetary values per country, with $6.8, $5.3 and $3.6 trillion per year, respectively. When expressed per hectare per year, the Bahamas, and Antigua and Barbuda had the highest value (over $20,000 per hectare per year) (Table 2.22). These differences are influenced by both the size of these countries and the different economic value of specific ecosystem types, with biomes like coastal wetlands and rainforests having particularly high economic values {2.5.1}.

Figure SPM.6
Economic values of ecosystem services in the Americas



Source: Based on Costanza et al., 2014 and Kubiszewski et al., 2017[8]

B. Trends in biodiversity and nature's contributions to people affecting quality of life

The threats to or declines in all the nature-based securities in the Americas reflect the ongoing reduction of nature's ability to contribute to human quality of life. Past rates of loss are high and losses continue, with some units under particular pressure (*well established*). From 2014 to 2015 approximately 1.5 million hectares of the Great Plains were lost to conversion {3.4.1.7}; between 2003 and 2013, the northeast agricultural frontier in Brazil more than doubled from 1.2 to 2.5 million hectares, with 74 per cent of new croplands taken from intact cerrado {3.4.1.6}; North American drylands lost 15–60 per cent of habitat between 2000 and 2009 {3.4.1.8}. Even relatively well conserved high elevation habitats have been degraded. For example, the Peruvian Jalca was converted at a rate of 1.5 per cent per year over a 20-year period starting from 1987 {3.4.1.5}. Nevertheless, increases in nature's contributions to people can be found locally, such as the Caribbean forests that are currently expanding as agriculture and the use of wood as fuel decline and the population becomes more urbanized, and the boreal forest that is also expanding as climate change allows favourable growing conditions to extend poleward {3.4.1.1, 3.4.1.2, 3.4.1.4, 3.4.1.6, 3.4.1.7}.

Wetlands are highly transformed in large tracts of the Americas, particularly by expansion of agricultural and ranching, urbanization and overall population growth (*well established*). For instance, over 50 per cent of all wetlands in the United States of America have been lost, with up to 90 per cent lost in agricultural regions {5.4.7}. The transformation of wetlands has altered ecosystem functions and biodiversity and reduced their ability to provide nature's contributions to people related to quantity and quality of fresh water, provision of food (fish, shellfish, rice, waterfowl), and climate regulation through carbon capture and sequestration {2.2.9, 2.2.10, 2.2.11; Figure 2.18; 3.4.1.9, 4.4.1, 4.4.2}.

[8] Costanza, R., R. de Groot, P. Sutton, S. van der Ploeg, S.J. Anderson, I. Kubiszewski, and R.K. Turner (2014). Changes in the Global Value of Ecosystem Services. Global Environmental Change 26:152–158. https://doi.org/10.1016/j.gloenvcha.2014.04.002.

Kubiszewski, I., R. Costanza, S. Anderson, P. Sutton (2017). The Future of Ecosystem Services: Global scenarios and national implications. Ecosystem Services. https://doi.org/10.1016/J.ECOSER.2017.05.004.

Analysis by Marcello Hernandez-Blanco. Prepared by the IPBES values technical support unit.

Marine biodiversity, especially associated with specific habitats like coral reefs and mangroves, has experienced major losses in recent decades, resulting in declines in the food, livelihoods and cultural continuity of coastal people (*well established)* {3.3.2, 4.4.2, 4.4.5, 5.4.11}. Coral reefs had declined in cover by more than 50 per cent by the 1970s, and only 10 per cent remained by 2003, followed by widespread coral bleaching in 2005 and subsequent mortality from infectious diseases (*established but incomplete*). Coastal salt marshes and mangroves are disappearing rapidly (*established but incomplete*). Considerable loss of seagrasses has also occurred, due primarily to eutrophication (*established but incomplete*) {3.3.2, 3.4.2.1}. Oceans of the Americas contain high numbers of threatened species, including large numbers of species that are important for human quality of life, as well as three of the seven global threat hotspots for more surface-dwelling oceanic sharks in coastal waters {3.3.2, 3.4.2}.

Alien species are abundant in all major habitats in the Americas, but rates of appearance where known, and their impacts on biodiversity, differ among subregions **(*established but incomplete*)** {**3.2.2.3, 3.2.3.2, 3.2.4.2, 3.5.1, 4.4.4}.** Based on potential vectors and disturbance levels, the terrestrial invasion threat across the Americas is highest in North America and Mesoamerica {3.2.2.3, 4.4.4; Figure 3.8}. Alien species (and other problematic species, genes and diseases) contribute to extinction risks to the greatest degree in North America, followed by the Caribbean, Mesoamerican and South America subregions {3.2.2.3; Figure 3.31}. Marine invasion is more frequent in North America, particularly on the Pacific coast (*well established*) {3.2.4.3}. Alien invasive species have numerous negative economic impacts. For example, the monetary cost to manage the impact of zebra mussels on infrastructure for power, water supply and transportation in the Great Lakes is over $500 million annually {3.2.2.3; Tables 3.2, 3.3; Figure 3.31; 4.4.4; Boxes 4.21–4.24}.

Overall, the risk of populations or species threatened with loss or extinction is increasing in the Americas, but the underlying causes are different among subregions (*well established*). Close to a quarter of the 14,000-species assessed by International Union for Conservation of Nature in the Americas are evaluated as threatened or endangered, with the highest proportion of assessed species classified as at risk in the Caribbean {3.5.1}. Aggregate extinction risk over a period of two decades showed generally heightened risk levels in the region, particularly in South America (*well established*) (Figure 3.30). Particularly high proportions of forest birds and mammals, most amphibian groups, and marine turtles and sharks are assessed as facing high-risk levels {3.2.3.1, 4.4.5}.

On local scales, there are many cases of restoration initiatives having improved degraded habitats, with greater biodiversity and a wider range of nature's contributions to people provided as the restoration efforts progress *(established but incomplete)* {4.4.1, 6.4.1.2}. Successful projects have been undertaken in North American grasslands, wetlands in North and South America, coastal forest in Mesoamerica, and sensitive coastal habitats in all subregions, particularly in the Caribbean. Nevertheless, restored areas still represent an extremely small proportion of the lands and waters in the Americas {4.4.1}.

C. Drivers of trends in biodiversity and nature's contributions to people

Some indicators of good quality of life are improving at regional and subregional scales, such as increased gross domestic product {4.3.2}, decreased malnutrition {2.3.1}, and increased sources of energy {2.3.3}; however, other indicators cause deep concerns, such as decreases in water security {2.3.2}, health {2.3.4}, sustainable livelihoods {2.3.5}, cultural continuity and identity {2.4}, and access and benefits sharing of nature {2.5} (*well established*). Many areas of concern were already identified in the Millennium Ecosystem Assessment as requiring action, but they have either improved little or deteriorated further in the ensuing dozen years (*well established*) (Figure SPM.5).

The upward trend in the size of the ecological footprint of the Americas reflects multiple indirect anthropogenic drivers (underlying factors), including unsustainable patterns of economic growth; **population and demographic trends; weaknesses in the governance systems; and inequity (*established but incomplete*) {4}.** Key economic drivers that may increase pressures on biodiversity and nature's contributions to people include factors related to increases in per capita consumption; technological developments that increase consumptive uses of natural resources; and international trade and finance that decouples consumption from products based on nature and nature's contributions to people {4.3, 4.7}. Increasing economic globalization has become an important driver of regional development, but has resulted in disconnection of the places of production, transformation and consumption of resource-based products (*established but incomplete*). This disconnection makes socioenvironmental governance and regulatory implementation more challenging {4.3, 4.7, 5.6.3}.

Economic growth (measured as gross domestic product and gross domestic product per capita), in part based on nature's contributions to people, and international trade based on commodities from nature, have been major drivers of natural resource consumption, water use, and a decline in water quality in the Americas (*established but incomplete*) {4.3}. Economic growth, as measured as gross domestic product growth and gross domestic product per capita, which has increased approximately sixfold since 1960, is a major driver of natural resource consumption in the Americas, as is international trade. Patterns of economic growth differ both among and within the subregions {1.6.3}, and the benefits of the growth have not been experienced equitably (*well established*) {2.3.5, 2.5, 4.3.2}. The economic growth of different nations also reflects the diversity of value systems in the Americas, which differ among cultural groups and identities across the whole region (*established but incomplete*) {2.5.1, 4.3.2, 5.6.4}. This is a reciprocal relationship, with cultural value systems influencing attitudes towards economic growth and the economic status of a community influencing the values attached to at least some of nature's contributions to people. This reciprocal relationship affects the priority that ecological sustainability plays in the selection of economic policies for growth and trade (*inconclusive*) {2.1.2, 5.6.4}.

Habitat conversion, fragmentation and overexploitation/overharvesting are resulting in a loss of biodiversity and ecosystem functions and a loss of or decrease in nature's contributions to people on local to regional scales in all biomes (*established but incomplete)* {3.2.3, 3.4.1, 3.4.2, 3.5.1, 4.4.1, 4.4.5}. The causes of habitat conversion and fragmentation vary subregionally and on more local scales, reflecting expansion of both more extensive and intensive forms of agriculture, livestock husbandry and forestry, and increases in urbanized areas and space allocated to infrastructure, including transportation and energy corridors {4.4.1, 4.4.5}. Habitat loss and degradation are associated with losses in species richness, changes in species composition, and erosion of ecosystem functions and nature's contributions to people (*well established*) {3.4.1; Figure 3.24; 4.4.1}.

Intensification of agricultural production has produced elevated nutrient loadings and introduced pesticides, pesticide residues and other agro-chemicals into ecosystems (*well established*). These elevated levels of nutrients and pollutants have negative consequences for ecosystem functioning and air, soil and water quality, including major contributions to coastal and freshwater oxygen depletion, creating "dead zones" with impacts on biodiversity, human health and commercial fisheries {1.2.1, 2.2.11, 3.2.1.3, 4.4.2}.

Human-induced climate change has already caused increased mean and extreme temperatures and/or precipitation in the majority of ecosystems in the Americas (*well established*) {4.4.3, 5.3}. These changes in weather and local climate have in turn caused changes in species distributions and interactions and in ecosystem boundaries, the retreat of mountain glaciers, and melting of permafrost and ice fields in the tundra {3.4.1.5}. Climate change has adversely affected biodiversity at the genetic, species and ecosystem level, and will continue to do so (*established but incomplete*) {4.4.2, 4.4.3}.

The air, water and soil pollution produced by combustion of fossil fuels has adversely affected most terrestrial and marine ecosystems, both directly, through increased mortality of sensitive plants and animals, and indirectly, through entering food chains (*well established*) {4.4.2}. Air pollution (especially particulates, ozone, mercury, and carcinogens) causes significant adverse health effects on elderly humans and infants and on biodiversity (*well established*). For example, increasing anthropogenic mercury emissions are entering the food of polar and subpolar wildlife and indigenous people with diets dominated by fish, eggs of fish-eating birds and marine mammals, affecting reproduction. Ocean acidification is affecting the calcium carbonate balance in the oceans and on the coasts, with negative effects on many types of biota, particularly species with shells or exo-skeletons, such as bivalves and corals {4.4.3}. In addition, many of the policies and actions taken to reduce the use of fuels that produce greenhouse gas emissions, such as the conversion of watersheds for hydroelectric development, or the conversion of land and the intensification of agriculture for biofuel production, bring with them potentially negative consequences for nature and for important nature's contributions to people {4.4.1, 4.4.3, 5.3}.

Urbanization and the associated spread of infrastructure for movement of energy, materials and people are a rapidly growing driver of loss of biodiversity and nature's contributions to people, but the nature and the magnitude of impacts varies substantially among the subregions of the Americas (***established but incomplete***). Urban land-cover change threatens biodiversity and affects ecosystem productivity through loss of habitat, biomass and carbon storage {3.3.4, 4.4.1}. The largest rates of increase in impacts occur in South America and Mesoamerica, and in coastal areas and habitats already severely fragmented, such as South American Atlantic Forest {4.4.1, 4.7}.

In the Americas, many different types of governance arrangements have developed. These occur in different social, economic and environmental contexts, associated with a diverse range of institutional arrangements and mechanisms that operate at multiple scales of intervention, from the global to the subnational levels. These regulatory mechanisms, incentive mechanisms and rights-based approaches can operate on both the supply and demand sides of nature's contributions to people and the pressures acting on them, using approaches such as public-private certification schemes or payment of ecosystem services, taking advantage of the rising role of markets in environmental governance {4.3, 4.7, 5.4.7, 5.6.3, 6.1.2; Figure 6.2}. The tools and approaches are not mutually exclusive and have been used in various combinations by a variety of forms of institutional arrangements, resulting in different implications for supporting and promoting the maintenance of nature's contributions to people. Thus, disentangling the role of governance institutions and processes as drivers of past trends in nature and nature's contributions to people is complex (*established but incomplete*).

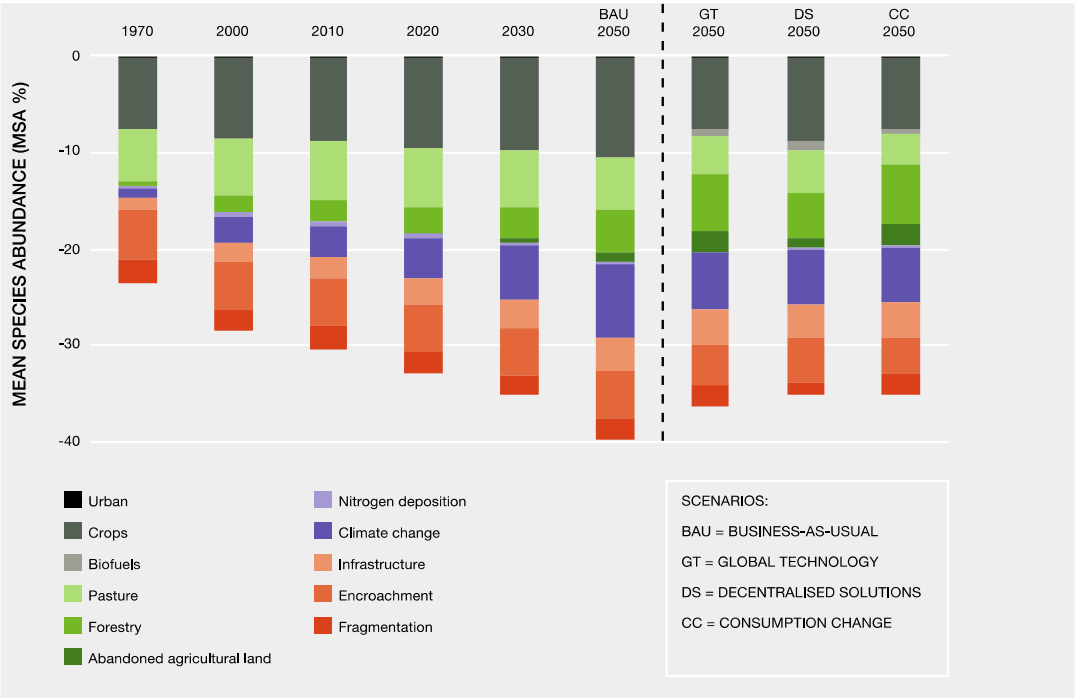
These governance tools and approaches, operating in many combinations and scales, often have not been effectively coordinated to achieve their objectives. Subordination of environment to economics in policy trade-offs and inequities in distribution of benefits from uses of nature's contributions to people continue to be present in all subregions (*established but incomplete*) {4.3, 6.1.1, 6.2, 6.4.2.1, 6.4.2.2, 6.4.3.1}. For most countries, at national scales, global commitments such as the Sustainable Development Goals and Aichi Targets have been endorsed, but development of national action plans are often uncoupled from national development and economic policies, and vary greatly among countries. This ineffective coordination has had adverse implications for nature, nature's contributions to people and quality of life {6.3}. On average, biodiversity and nature's contributions to people have been diminishing under the current governance systems in the Americas, although local instances of successful protection or reversal of degradation of biodiversity show that progress is possible (*established but incomplete*) {5.5.2, 5.6}.

D. Future trends in biodiversity and nature's contributions to people and global commitments

The projected 20 per cent increase in population and doubling of gross domestic product of the Americas by 2050 {4.3.2} will increase the intensity of many drivers if existing patterns of consumption and the policies underlying them are continued (*well established*). All anthropogenic drivers are projected to continue to affect all ecosystems, across all spatial scales, under all future scenarios, although the specific trajectories and rates of change in biodiversity and nature's contributions to people depend on the assumptions used in the various scenarios. These multiple drivers are expected to interact, often in ways that further increase their impact on biodiversity loss, although the strength of the drivers is projected to vary with ecosystem type and the extent of past disturbance (*established but incomplete*) {4, 5.4.7, 5.3, 5.6}.

Despite reported reductions in the rate of degradation in some units of analysis, the net loss that is currently evident in almost every aspect of the region's natural terrestrial ecosystems is expected to continue through to 2050 and beyond, **driven largely by unsustainable agricultural practices (for crops and pasture lands) and climate change (*established but incomplete*) (Figure SPM.7)**. Changes in temperature and precipitation regimes and increases in frequency of extreme climate events are predicted to impact all units of analysis in the Americas, although the magnitude and time course of the impacts are uncertain (*established but incomplete*) {4.4.1, 4.4.3, 5.5.2}.

Figure SPM.7
Pressures driving biodiversity loss in the Americas



Source: PBL Netherlands Environmental Assessment Agency, 2012 and 2014.[9]

Policy interventions at vastly differing scales (from national to local), as well as behavioural changes and improved technologies, can lead to successful outcomes in mitigating impacts on biodiversity (*established but incomplete*) {5.5} (Figure SPM.8). Three different pathways to sustainability are considered in the Global Biodiversity model for policy support: global technology (large-scale technologically-optimal solutions), decentralized solutions and consumption change. Under these pathways, climate change mitigation, the expansion of protected areas and the recovery of abandoned lands would contribute significantly to reducing the biodiversity loss driven by crops, pastures and climate change. Although the three pathways to sustainability are expected to result in a reduction of those pressures on biodiversity in comparison to the projected baseline scenario for 2050, other pressures on biodiversity, such as forestry, biofuels and abandoned land, are expected to increase. Under the business-as-usual scenario, climate change is projected to become the fastest growing driver of biodiversity loss by 2050, and a loss of almost 40 per cent of all original species in the Americas is expected, while under the three pathways to sustainability, a loss of [35 – 36] per cent is projected. This trend varies among subregions. Results from the Global Biodiversity model for policy support show that those pathways that consider changes in societal options will lead to less pressure on nature {5.5}.

Because of policy choices and trade-offs with negative impacts on aspects of biodiversity, nature's contributions to people and quality of life, it is likely that few of the Aichi Targets will be met by the 2020 deadline for most countries in the America. Over the longer term, few of the Sustainable Development Goals or the targets on greenhouse gas emissions in the Paris Agreement on climate change will be met (*established but incomplete*) {2.3, 3.2.2, 3.2.3.2, 3.2.4.2, 3.2.7, 3.3.1.10, 3.3.2, 3.4.1.1}.

A large number of studies across taxonomic groups and biomes (temperate and tropical forests, grasslands and marine systems) support links between biodiversity and productivity, stability and resilience of ecosystems (*well established*) {3.1.2, 3.1.3}. Thus, projections of further loss of biodiversity are of great concern, because future ecosystems will be less resilient. Additionally, they

[9] PBL Netherlands Environmental Assessment Agency (2012). *Roads from Rio+20. Pathways to achieve global sustainability goals by 2050.* The Hague: PBL Netherlands Environmental Assessment Agency.

PBL Netherlands Environmental Assessment Agency (2014). *How sectors can contribute to sustainable use and conservation of biodiversity.* Secretariat of the Convention on Biological Diversity, Montreal. Technical Series 79.

are expected to face an even wider array of drivers than have been the primary causes of degradation in the past (*established but incomplete*) {5.4}. This in turn would make ecosystems even less able to provide the present levels of nature's contributions to people and support good quality of life. Some environmental and social thresholds (or tipping points: conditions resulting in rapid and potentially irreversible changes) are being approached or passed (*established but incomplete*) {5.4}. For instance, the interaction of warming temperatures and pollution is increasing the vulnerability of coral reefs in the Caribbean {4.4.2, 4.4.3}: under a 4°C warming scenario, widespread coral reef mortality is expected, with significant impacts on coral reef ecosystems {5.4.11}.

E. Governance, management and policy options

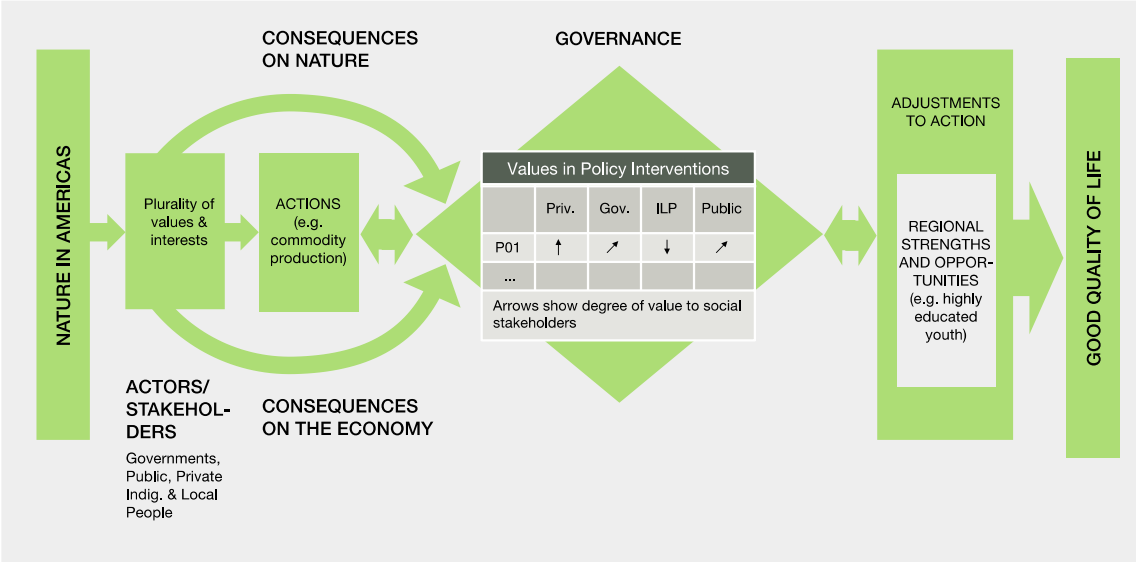
A variety of governance processes have been developed, based on the mixture of cultures represented in the many post-European colonial governments and societies and the diverse indigenous cultures in the Americas (*well established*). Recently, there has been increasing empowerment of the participants in those governance processes, which allows greater use of the knowledge of indigenous peoples and local communities. The diversity of governance processes and knowledge systems offers many opportunities for increasing the priority given to sustainability and equity in decision-making about nature and nature's contributions to people {5.6.2, 5.7}. The widespread endorsement of high-level agreements on biodiversity, climate change and sustainable development by almost all American countries also allows for the sharing of lessons learned under common overall goals for development and sustainability {6.5}. Nevertheless, current information is not sufficient to clarify the degree to which governance processes and their outcomes are scalable from the local to the subnational, national, regional or global level or in the reverse direction. There is evidence of both successes and failures in scaling experiences upward or downward. Hence, there cannot yet be confidence that experience gained in one set of ecological, socioeconomic and governance circumstances can be generalized to other circumstances (*unresolved)* {6.3.4}. In addition, there is no single governance approach or set of approaches to governance that will address all challenges being faced in the management of biodiversity and nature's contributions to people in the Americas. Mixed governance systems and modes have proven to have different degrees of effectiveness across subregions {4.3.1, 6.3; Table 2.25} (Table SPM.1). What is now widely accepted, though, is that ineffective governance undermines biodiversity and nature's contributions to people (*well established*) {6.3.2}.

The plurality of values in the Americas shapes the use, management and conservation of nature and nature's contributions to people {1.1, 2.1.2, 2.5} (Figure SPM.8). Addressing this plurality of value systems, through participative governance processes and institutions, contributes to the design and implementation of effective conservation plans. Such effectiveness can be further increased by combining it with decentralized decision-making on local and subnational issues regarding development policies, land tenure and indigenous rights, and decisions on land use and natural resources exploitation. A diversity of cases across policy areas, levels of economic development and political cultures suggest that partnerships and participatory deliberative processes contribute to a large class of problem-solving situations and can support effective governance, because they allow multiple and sometime conflicting values to be considered at the local scale {6.3.1, 6.3.2, 6.3.3} (Table SPM.1).

Figure SPM.8

The plurality of values and interests shaping governance processes and policy and decision-making in the Americas

This figure illustrates how a resource management decision flows through the complex dynamics of governance. Diverse values and interests of people will inherently have trade-offs, benefiting some while costing others, with consequences for nature and the economy. Governance is where choices are made in response to the matches and mismatches of consequences of feedbacks from a particular use of nature, depending on actors' values and power. For example, where land could be used for high value mono-cropping that would be profitable for private farmers and agro-industry (PO1), that land may also have value to indigenous people as ancestral spiritual places or a source of livelihood, and to the public for recreation, i.e. sport fishing/hunting and camping. Central governments, some private-sector individuals and businesses may assign a high value to the economic dimension of this policy intervention (e.g., tax revenue to governments), and would experience an increase in their quality of life. Indigenous and local people may attach a high value to features of nature in the area and feel that their quality of life would be harmed by the same intervention. The public may have ambivalent views of the initiative: an improvement in quality of life from cheaper food, but a decline in quality of life from lost recreational space. It is in the context of governance institutions and processes that these conflicting values and experiences are negotiated, trade-offs discussed, and a way forward selected. Historically, power in governance has often worked in favour of monetary value over spiritual sites, small-scale livelihoods and places for recreation, favouring economic policy interventions. Increasingly, however, policy interventions that balance these economic and environmental consequences and take advantage of regional strengths as opportunities (such as the large social capital, institutional diversity, widespread endorsement of high level agreements on biodiversity, climate change and sustainable development) are showing greater potential to achieve an inclusive sustainable development and better quality of life in the Americas.



Source: Own representation.

Table SPM.1
Policy options in the Americas: instruments, enabling factors and country-level challenges

POLICY INSTRUMENTS	GOALS			ENABLING FACTORS (Way forward)	IMPEDIMENTS (Challenges more common to some countries than others)	CHAPTER -SECTION
	SU	RE	PR			
1. REGULATORY MECHANISMS						6 – 6.4.1
1.1 AREA-BASED						-
Protected areas	√	√	√	Legal basis for protecting or setting aside specific areas Community support for exclusionary measures Effective management authority by State, community or private sector Adequate resources for monitoring and enforcement	Weak or unstable legal basis for multi-sectoral management measures Insecure funding for on-going surveillance and enforcement of protection measures Low compliance with protection measures Lack of community support for measures Private sector investments threatened by spatial exclusions Fragmentation of sites and/or inadequate spatial connectivity	3 – 3.5.2 6 – 6.4.1.1
Other effective area-based conservation measures (OECM) (e.g., set-asides[1])	√	√	√			2 – Box 2.4 2 – 2.3.2 2 – 2.3.5 3 – Box 3.1 3 – 3.3.4 3 – 6 4 – Box 4.5 5 – 5.4.7 5 – 5.4.10 6 – 6.4.1.1
Indigenous and Community Conserved Areas (ICCA)	√	√	√	Capacity of self-organization Official acknowledgement of rights Mechanisms allowing co-management and/or self-governance systems	Weak or missing recognition of indigenous and community rights and ownership/ access to land by Central governments, neighboring communities or private sector	2 – 2.2.6 3 – 3.4.1.1 5 – 5.4.11 6 – 6.4.1.1 6 – 6.4.1.2
1.2 LIMITS						-
To technology (e.g., pollution control)	√		√	Adequate background information and risk analysis to set limits Technological advances to reduce or mitigate pollution /by-products while maintaining economic efficiency Adequate resources for monitoring and enforcement Application of precaution in decision-making	Disproportionate political influence of industries Technological advances that outstrip or negate control mechanisms Low risk aversion in setting limits Weak monitoring and surveillance for compliance	3 – 3.2.2.3 3 – 3.3.3.2 3 – 3.2.4 4 – 4.4.2 6 – 6.2.1 6 – 6.6.2
To access (e.g., tourism, fisheries)	√		√	Governance capacity at local level Clear rules to manage potential sources of revenue Social cohesion and participation	Inability to regulate access to areas Lack of human and financial resources Excessive expectations from the market of enhanced consumer demand Inadequate sharing of benefits	4 – Box 4.19 4 – 4.3.3 6 – 6.6.1
1.3 MANIPULATION						-
Ecosystem restoration	√	√		Technological and knowledge availability Economic incentives to overcome high costs favourable policy environment to promote restoration Funding for up-front costs to undertake restoration Mechanisms for cost recovery of benefits from successes	Lack of recognition of restoration in legal frameworks Inadequate funding for continuity of initiatives Insufficient knowledge to design effective restoration strategies for specific sites Lack of elimination of causes of original degradation Unreal expectations of time or funding needed for restoration to reach goals	2 – 2.2.8 2 – 2.2.11 2 – 2.2.13 4 – 4.4.1 5 – 5.4.7 6 – 6.4.1.2
Ecosystem-based approaches (e.g., EbA[2] and EcoDRR[3])	√	√	√	Availability of financing Receptiveness of industries to take on additional operating costs Inclusive governance with policy endorsement of Ecosystem Approaches to Management (use of the best knowledge available)	Weaknesses in science basis for broadening management context and accountabilities Lack of cost-effective operational tools to address full ecosystem effects of sectoral actions Lack of knowledge of transferability of progress from project to project Absence of policy framework explicitly calling for ecosystem approaches at sectoral levels	3 – 3.6 4 – Box 4.14 4 – 4.4.3 4 – 4-4.5 6 – 6.6.3

POLICY INSTRUMENTS	GOALS			ENABLING FACTORS (Way forward)	IMPEDIMENTS (Challenges more common to some countries than others)	CHAPTER -SECTION
	SU	RE	PR			
Control of Invasive-Alien Species (IAS)	√	√	√	Strong regulatory frameworks for pathways of introductions Availability of technologies for management and control Adequate monitoring for early detection Local capacity and collaboration networks for site-level mobilization of community resources for management or elimination	Shortage of scientific information on invasion pathways and likelihood successful establishment Low awareness of risks by people involved in major invasion pathways Inadequate facilities for interception and quarantine facilities Inadequate or insecure funding for ongoing interception, monitoring and control	2 – 2.2.15 2 – 2.3.4 3 – 3.2.2.3 3 – 3.2.3.2 3 – 3.2.4.2 3 – 6 4 – 4.4.4 6 – Box 6.3
2. INCENTIVE MECHANISMS						6 – 6.4.3
Payment for Ecosystem Services (PES)	√	√	√	Trust building between service users and providers Direct linkages between buyers and sellers Adequate metrics for calculating payments Fair and transparent markets for exchange of payments Adequate monitoring when payment is for ongoing provision of services	Low return on investment for those paying for services Weak information basis for calculating appropriate payments Land tenure rights not adequate protected from payment arrangements Power structures that do not promote equitable and transparent payment agreements or distribution of payments Lack of recognition of non-market values of Nature and NCP when negotiating payment agreements, or lack of measures or governance processes to protect to values	2 – 2.5.1 4 – 4.3.1 6 – 6.4.2.1
Offsets	√	√		Sufficient science / knowledge base to quantify both impacts and expected benefits form offsets; Sufficient legal basis to authorize offsets as a mitigation options Adequate capacity for enforcement management and monitoring; Transparent and inclusive settings for establishing appropriate trade-offs of offsets for likely impacts.	Many weaknesses or gaps in knowledge basis for trade-off metrics, establishing equivalence, additionality, reversibility and appropriate time-scales, longevity Low availability of areas for spatial delivery of offsets Lack of resources for ongoing compliance monitoring Low adaptability of agreements on offsets, once established, if monitoring shows that benefits accruing are lower than expected or impact higher	6 – 6.4.2.2
Eco-certification	√			Adequate knowledge to set and enforce standards Reliable chain of custody for certified products Demand in high-value markets that can bear price increment for certainty of sustainability, High consumer recognition and credibility for certification labels	Weak government – private sector linkages High up-front costs to demonstrate sustainable practices and earn certification, before any economic benefits are realized Increases in operating costs so large that market competitiveness may be lost Lack of transparency in markets	2 – 2.2.1.3 2 – 2.2.1.5 2 – 2.2.2.1 6 – 6.4.2.3
3. RIGHTS-BASED APPROACHES						6 – 6.4.2
Rights of Mother Earth	√		√	Capacity of self-organization Official acknowledgement of rights Mechanisms allowing co-management and/or self-governance systems	Inadequate recognition of "rights" of Non-persons in law Challenges in delimiting when such rights would be transgressed in areas already urbanized or under intensive cultivation	2 – 2.4 3 – Box 3.3 4 – Box 4.7 6 – 6.3.5
Access and Benefit Sharing (ABS)	√			Human and institutional capacities to grant access Capacity to monitor and negotiate mutually agreed terms Robust legal frameworks to require sharing benefits Inclusive, participatory mechanisms for establishing agreements	Weak legal basis to require benefit sharing of many uses of Nature Unrealistic expectations of quantity of monetary benefits Complexity and lengthy procedures for setting benefits Fundamental challenges to property rights, including intellectual property rights	2 – 2.4 2 – 2.5 2 – Box 2.6 2 – 2.7 6 – 6.4.2.4

Abbreviations: PR - protection; RE - recovery or rehabilitation of natural and/or human systems; SU - sustainable use; set-asides - areas set aside for conservation inside private properties; EbA - ecosystem-based adaptation to climate change; EcoDRR - ecosystem-based disaster risk reduction.

Source: Own representation.

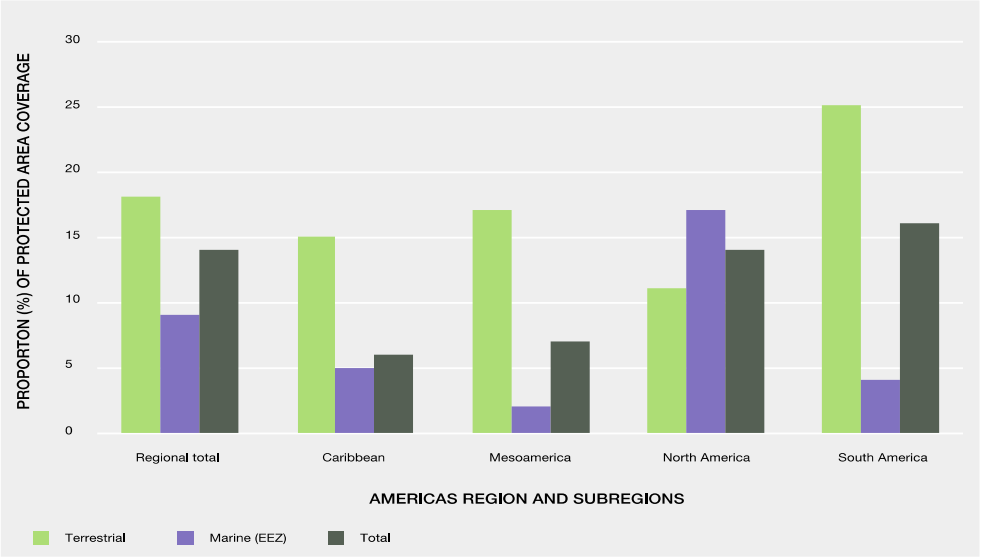
Regardless of the degree of participation in governance, existing social and cultural inequalities can be reinforced by unequal power exercised by different participants within the governance processes when decisions are being made about nature and the use of nature's contributions to people (*well established*). As the population in the Americas becomes increasingly urban, trade-offs between the livelihoods of primary users of nature's contributions to people (e.g., indigenous people and rural and coastal people) and secondary users (e.g., suburban and city dwellers) mean that decision-making power will shift increasingly towards those who have a less direct relationship to nature's contributions to people for their livelihoods {2.3.5}. This can decrease the influence of management systems and locally adapted technologies developed by indigenous and local communities rooted in knowledge acquired through centuries of experience with agricultural

production, domestication of plants, use of medicines, protection of soils, etc. (*established but incomplete*) {5.6.3}. Such power inequalities can strongly influence the outcomes of discussions about trade-offs among nature's contributions to people or between biodiversity protection or use. Governance actions to change policies at multiple scales, from local to regional or global, are necessary to fully address these inequalities, accompanied by strong adherence to the principle of subsidiarity so that local and indigenous communities would have greater control over the nature's contributions to people on which their cultures depend {4.3.1, 6.3.5}. New governance processes may be needed to coordinate actions across scales (*inconclusive*). The effectiveness of participatory governance systems can be enhanced with a number of enabling conditions (Table SPM.1), including building capacity among all stakeholder groups to engage in such processes and providing equal access to information relevant to the governance dialogue, in order to avoid having the processes captured by the most powerful stakeholders, such as local elites, government agencies and private enterprises.

Within governance arrangements, several types of political instruments are available. Measures to protect biodiversity in the Americas, including regulatory mechanisms, incentives and rights-based approaches, have increased and diversified over the last 30 years (*well established*) (6.4; Table SPM.1). In addition to conservation and protected areas, spatial measures now include indigenous reserves, community-conserved areas, private conservation initiatives and conservation measures in the managed landscapes matrix {2.2.8, 6.4.1}. However, protection efforts are unevenly distributed across subregions and among units of analysis, and large differences in protection efforts persist for terrestrial, freshwater and marine ecosystems {2.2.8, 3.4.1} (Figure SPM.9). Also, the effectiveness of such protection is questionable or low in many instances. The establishment of indigenous conservation areas has contributed to reducing the rate of deforestation in South American biomes, although anthropogenic fires, pollution from off-site activities and illegal logging, which are all recognized degradation drivers, were identified within these areas (*established but incomplete*) {6.4.1}. The causes of weak effectiveness of spatial protection measures, when it occurs, include poor selection or inappropriate configuration of sites to be protected, poorly designed management plans for the protected areas, inadequate resources or efforts for implementation of the measures, and insufficient monitoring of the biodiversity to be protected, such that adaptive management cannot be applied (*established but incomplete*) {6.2.4}.

Figure SPM.9

Protected area coverage in the Americas region and subregions as a percentage of total land or marine surface area



Source: Based on United Nations Environment Programme-World Conservation Monitoring and International Union for Conservation of Nature, 2015, synthesized by Brooks et al., 2016.[10]

[10] United Nations Environment Programme-World Conservation Monitoring and International Union for Conservation of Nature (2015). *Protected Planet: The World Database on Protected Areas* (WDPA). Cambridge, United Kingdom of Great Britain and Northern Ireland. Retrieved from www.protectedplanet.net.

T.M. Brooks, H.R. Akçakaya, N.D. Burgess, S.H. Butchart, C. Hilton-Taylor, M. Hoffmann, D. Juffe-Bignoli, N. Kingston, B. MacSharry, M. Parr, L. Perianin, E.C. Regan, A.S. Rodrigues, C. Rondinini, Y. Shennan-Farpon, and B.E. Young (2016). Analysing biodiversity and conservation knowledge products to support regional environmental assessments. Scientific Data, 3, [160007]. DOI: 10.1038/sdata.2016.7.

Ecological restoration is having positive effects at local scales. Restoration has sped up ecosystem recovery significantly in the majority of cases considered, and improved the ability of such areas to provide nature's contributions to people (*established but incomplete*) {4.4.1, 5.3, 5.5}. However, restoration of ecosystems and species has high up-front costs and usually requires long periods of time. Furthermore, full reversal of degradation, if possible at all, has not been demonstrated, and non-material contributions may not be restored for some people (*established but incomplete*) {6.4.1.2}. Also, restoration activities in some biomes, such as non-forest systems in the tropics and subtropics (especially wetlands, savannas and grasslands), are still rare, despite high rates of degradation and subsequent losses of nature's contributions to people. Sustainable use to avoid degradation is clearly preferable to restoration of degraded diversity and the corresponding reduction in nature's contributions to people {4.4.1}.

Although protected and restored areas are relevant for maintaining options and increasing security in providing nature's contributions to people in the long term {6.4.1.1} and have an important role in conservation planning, they will always comprise a minority of the land and sea. Diverse, more integrative strategies, from the holistic approaches of many indigenous peoples in the Americas {2.4} to the ecosystem-based approaches of sectoral management, have all been effective when appropriately implemented (Table SPM.1). Nature's contributions to people also can be greatly enhanced and secured within human-dominated landscapes, such as agricultural landscapes and cities, and strategies for making human-dominated landscapes supportive of biodiversity and nature's contributions to people are essential. Such strategies should include multifunctional, diverse, heterogeneous landscapes, which contribute to the diversity of nature's contributions to people and allow for a better balance of different types of nature's contributions to people {2.2.13, 4.4.4}, and are effective means of maintaining options for access to many nature's contributions to people in the future (*established but incomplete*) {2.2.8}.

For most countries of the region, the environment has been mostly dealt with as a separate sector in national planning, and has not been effectively mainstreamed across development sectors. Greater mainstreaming is occurring in many governments, but scope for substantially more progress has been identified in many reviews, including by the Conference of the Parties to the Convention on Biological Diversity at its thirteenth meeting in December 2016 (*well established*) {6.2.1, 6.3.3}.

Policymaking is more likely to be effective in achieving conservation and development goals when it takes into account (i) trade-offs between both short- and long-term conservation and development goals and their effects on different beneficiaries, (ii) transboundary issues and (iii) leakage and spillover effects. All biome types in the Americas face multiple pressures, and although cases of simultaneous improvements in biodiversity, nature's contributions to people and quality of life can be found, these instances are rare (*established but incomplete*) {5.4}. More commonly:

(i) Trade-offs are made that result in at least short-term losses in some aspects of biodiversity and nature's contributions to people, either in order to increase the amount or availability of other nature's contributions to people (e.g., commodity-oriented agriculture) or to pursue activities not directly dependent on nature or nature's contributions to people but nevertheless impacting nature (e.g., building transportation infrastructure). It is common for these tradeoffs to be experienced in different ways by different world views and cultures, depending on their values {2.12, 2.7} (Figure SPM.8). This is true for all biomes or vegetation types in the Americas, as all biomes produce nature's contributions to people important to quality of life for local inhabitants of the areas under pressure, and often for much larger areas or globally.

(ii) National governance processes and institutions to address sustainability of resource use and biodiversity conservation are challenged in several ways on both larger and smaller scales. The root causes of some threats to biodiversity and nature's contributions to people, such as ocean acidification, plastic pollution in oceans and climate change, are inherently above the national scale {4.4.2, 4.4.3}. Efforts to address these successfully will require international collaborations that could improve the effectiveness of national and subnational plans, and, where institutional arrangements allow, transboundary governance of nature's contributions to people (*established but incomplete)* {6.4; Box 6.3}.

(iii) Implementation of some policies can lead to adverse impacts (i.e. loss of biodiversity) in other regions, through leakage and spillover effects *(established but incomplete*). Therefore, it is critical to assess whether policies are likely to have negative impacts elsewhere. Causal interactions between distant places (i.e., telecoupling) and leakage and spillover effects in many levels and scales across the region should be considered when implementing policies {4.3, 4.7, 5.4.7, 6.3.4}.

The increasingly broad arrays of policy instruments used by a range of actors to support the management of biodiversity and nature's contributions to people and to avoid or mitigate impacts on the different ecosystems have not added up to overall effectiveness at the national or subregional scales, although they are often effective locally (*established but incomplete*). Although policy development and adoption are important, there are other factors that must be addressed for effective biodiversity conservation and provision and maintenance of nature's contributions to people. Effective implementation of public policies requires appropriate combinations of behavioural change {4.3.1, 5.4.7}, improved technologies {4.3.4, 5.4.7, 6.6.4}, effective governance arrangements {5.4.7, 6.3.2, 6.3.3}, education and public awareness programs {6.3.5, 6.4.1.1, 6.4.1.2}, scientific research {6.6.4}, monitoring and evaluation {6.3.1; Table 6.1; 6.4.2, 6.6.1}, adequate finance arrangements {6.4.2.1}, and supporting documentation and capacity building {6.6.4}. The required behavioural changes may be needed from individuals, communities, business and corporations and governments (*inconclusive*). Addressing these factors to promote conservation and sustainable use of biodiversity and nature's contributions to people can be aided by enabling governance arrangements, including partnerships and participatory deliberative processes, and recognition of the rights of indigenous peoples and disadvantaged groups. Effective implementation can also be facilitated when policies are perceived as presenting opportunities for stakeholders, including individuals, communities and the private sector, and not just imposing further limitations on their choices {6.3.1; Table 6.1}. Additionally, policymakers can use trade-off analyses and plural valuations to maximize both nature conservation and development {2.5.1, 2.7}. Bundles of nature's contributions to people can be prioritized in policy interventions to achieve specific Sustainable Development Goals related to health, food and material security, energy and climate, water quality and quantity, and relational values of nature (Figure SPM.10). While it is clear that some material nature's contributions to people are crucial to achieving a specific Sustainable Development Goal, it is also evident from the plurality of values involved in quality of life that non-material nature's contributions to people, like learning and inspiration, and transversal nature's contributions to people, like maintenance of options, are equally important {2.7; Table 2.26}.

Figure SPM.10

Bundles of nature's contributions to people that are considered to be a priority for achieving the Sustainable Development Goals

To determine nature's contributions to people that policymakers should prioritize to achieve specific Sustainable Development Goals, the Americas assessment included a Delphi process to elicit expert opinions from its authors and establish levels of consensus regarding the three most important of nature's contributions to people for each Sustainable Development Goal. Subsequently, a cluster analysis was conducted with a Louvain algorithm to ascertain bundles of nature's contributions to people/Sustainable Development Goal with similar relationships (see legend for colour coding of bundles). Blank cells indicate no responses, and the size of dots within cells illustrates the level of consensus among experts (per cent of respondents who prioritized nature's contribution to people for a specific Sustainable Development Goal).[11]

[11] Data collected by C.B. Anderson, C.S. Seixas and O. Barbosa. Analysis by J. Diaz in R software package.

Knowledge gaps were identified in all chapters. The assessment was hampered by the limited information (i) on the impact of nature's contributions to people to quality of life , particularly because there is a mismatch between social data related to quality of life produced at the political scale and ecological data produced at a biome scale; (ii) on non-material nature's contributions to people that contribute to quality of life, (iii) for assessing the linkages between indirect and direct drivers and between the drivers and specific changes in biodiversity and nature's contributions to people, and (iv) on the factors that affect the ability to generalize and scale the results of individual studies up or down. Much biodiversity remains to be scientifically recorded for all types of ecosystems, particularly in the South American subregion and in the deep oceans in general. Short-term and long-term policy evaluation in the Americas is generally insufficient. This is most pronounced in Mesoamerica, South America and the Caribbean. Investments in generating new knowledge on these matters may better elucidate how human quality of life is highly depend on a heath natural environment, as well as how threats to natural environments affect quality of life in the short, median and long-term.

Appendix 1

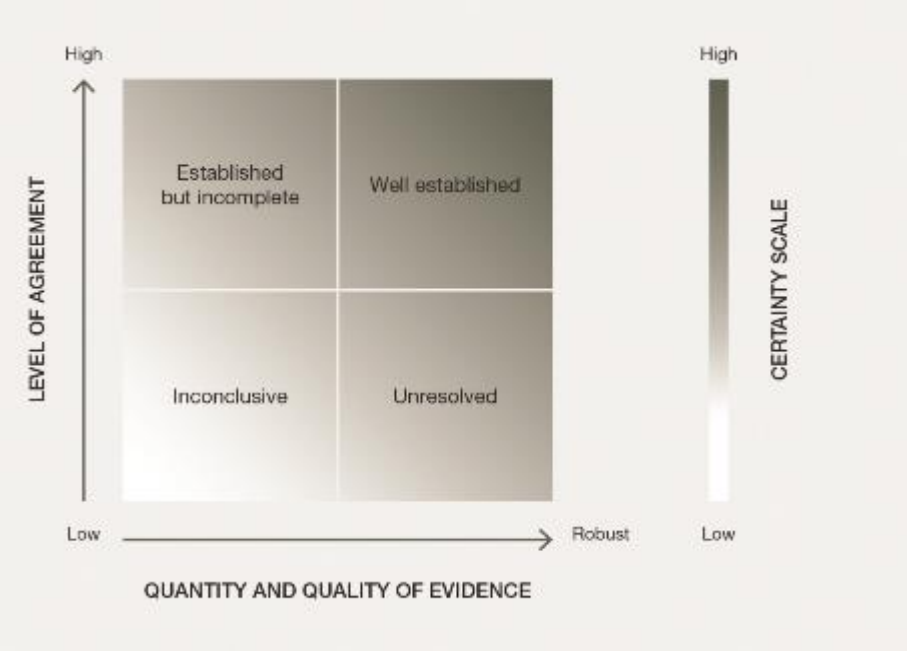
Communication of the degree of confidence

Each key finding of an IPBES assessment report, whether in the executive summary of the chapters or in the summary for policymakers, is accompanied by a confidence language statement. In assessments, and in relation to knowledge, confidence refers to the degree of certainty that experts have about their findings. Low confidence describes a situation of incomplete knowledge, when an outcome cannot be fully explained or reliably predicted, whereas high confidence conveys extensive knowledge and the ability to explain an outcome or predict a future outcome with much greater certainty. Low confidence thus signals the need for further research.

The degree of confidence in each main finding is based on the quantity and quality of evidence and the level of agreement regarding that evidence (Figure SPM.A1). The evidence includes data, =theory, models and expert judgement. IPBES assessments use four specific phrases known as "confidence terms" in order to categorize the experts' level of confidence in their findings consistently, expressed in a four-box model of confidence as follows:

- "well established" (robust evidence and high level of agreement)
- "unresolved" (robust evidence but low level of agreement)
- "established but incomplete" (low quantity and quality evidence but general level of agreement)
- "inconclusive" (low quantity and quality of evidence and low level of agreement)

Figure SPM.A1
The four-box model for the qualitative communication of confidence
Confidence increases towards the top-right corner as suggested by the increasing strength of shading.



Source: IPBES, 2016.[12]

[12] IPBES, Summary for policymakers of the assessment report of the Intergovernmental Science-PolicyPlatform on Biodiversity and Ecosystem Services on pollinators, pollination and food production. S.G. Potts, V. L. Imperatriz-Fonseca, H. T. Ngo, J. C. Biesmeijer, T. D. Breeze, L. V. Dicks, L. A. Garibaldi, R. Hill, J. Settele, A. J. Vanbergen, M. A. Aizen, S. A. Cunningham, C. Eardley, B. M. Freitas, N. Gallai, P. G. Kevan, A. Kovács-Hostyánszki, P. K. Kwapong, J. Li, X. Li, D. J. Martins, G. Nates-Parra, J. S. Pettis, R. Rader, and B. F. Viana (eds.). Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany, 2016. Available from www.ipbes.net/sites/default/files/downloads/pdf/spm_deliverable_3a_pollination_20170222.pdf.

Appendix 2

Nature's contributions to people

Nature's contributions to people are all the contributions, both positive and negative, of living nature (i.e., diversity of organisms, ecosystems and their associated ecological and evolutionary processes) to the quality of life of people. Beneficial contributions from nature include such things as food provision, water purification, flood control and artistic inspiration, whereas detrimental contributions include disease transmission and predation that damages people or their assets. Many of nature's contributions to people may be perceived as benefits or detriments depending on the cultural, temporal or spatial context.

The concept of nature's contributions to people broadens the widely-used ecosystem services framework[13] by also considering views on nature versus human relations held by other knowledge systems. It is not intended to replace the concept of ecosystem services. Rather, nature's contributions to people broaden the scope for bringing social sciences and humanities to the ecosystem services approach, by making possible a more integrated cultural perspective on ecosystem services.

Ecosystem services has always included a cultural component among its four categories:

- Supporting services (now part of "nature" in the IPBES Conceptual Framework)
- Provisioning services
- Regulating services
- Cultural services

At the same time, there has been a long-standing debate in the ecosystem services science community, and in policy circles, about how to deal with culture. The social science community emphasizes that culture is the lens through which ecosystem services are perceived and valued. In addition, the categories of ecosystem services have tended to be discrete, while nature's contributions to people allow for a more fluid connection across the above dimensions. For example, food production, traditionally considered to be a provisioning service, can now be categorized both as a material and a non-material contribution by nature to people. In many –but not all – societies, people's identities and social cohesion are strongly linked to growing, gathering, preparing and eating food together. It is thus the cultural context that determines whether food is a material contribution by nature to people, or one that is both material and non-material.

The concept of nature's contributions to people was developed to address the need to recognize the cultural and spiritual impacts of biodiversity, in ways that are not restricted to a cultural ecosystem services box, but instead encompasses diverse world views of human-nature relations. Nature's contributions to people also make it possible to consider negative impacts or contributions, such as disease.

There are 18 categories of nature's contributions to people, which closely map on to the three categories of ecosystem services (noting that supporting services are no longer an ecosystem service in the IPBES Conceptual Framework).

[13] Millennium Ecosystem Assessment (2005). Ecosystems and human well-being. (Island Press, Washington, D.C.).