



Distr.: General
22 November 2013

English only



**United Nations
Environment
Programme**

**Plenary of the Intergovernmental Science-Policy
Platform on Biodiversity and Ecosystem Services
Second session**
Antalya, Turkey, 9–14 December 2013

**Report of the international expert workshop on the conceptual
framework for the Intergovernmental Science-Policy Platform for
Biodiversity and Ecosystem Services**

Addendum

**Recommended conceptual framework for the Intergovernmental
Science-Policy Platform for Biodiversity and Ecosystem Services:
background report**

Note by the secretariat

The annex to the present note sets out a background report on the recommended conceptual framework for the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services prepared by the Platform's Multidisciplinary Expert Panel. The report provides information that supplements the information in document IPBES/2/4. It is presented as received from the Panel and has not been formally edited.

Annex

Recommended conceptual framework for the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services: background report

Table of contents

I.	Introduction and rationale for a conceptual framework for the Platform	3
II.	Conceptual framework of the Platform	3
	A. Essential elements of the conceptual framework	3
	B. Essential elements of the conceptual framework Interlinkages between the elements of the conceptual framework	7
	C. Example: the causes and consequences of declining fisheries	8
	D. Application of the conceptual framework across scales	9
	E. Validation in the context of the IPBES conceptual framework	9
	F. Values and valuation in the context of the IPBES conceptual framework.....	10
III.	Links between the conceptual framework, work programme and functions of the Platform	11
	A. Work programme.....	11
	B. Conceptual framework and the functions of the Platform	11
	C. Science-policy interface.....	12
	D. Operation of the science-policy interface	12
IV.	Glossary	14
V.	Sources	17
VI.	Acknowledgements	21

I. Introduction and rationale for a conceptual framework for the Platform

1. Human life would not be possible without biodiversity and ecosystems. The intervention in nature by human societies to meet their needs, however, has modified the composition, structure and functions of ecosystems and has caused detrimental changes that seriously threaten the long-term sustainability of societies around the world. In many cases, biodiversity loss and poverty are trapped in a mutually reinforcing vicious circle. Overall, the efforts made on conservation and on the sustainable use of biodiversity and ecosystems have not kept pace with increasing human pressures. The alarming loss of biological diversity and ecosystem services is threatening long-term human well-being and in particular that of some of the poorest people on the planet, who rely to a large extent on the services provided by the ecosystems they live in. More affluent segments of society may partially and temporarily overcome the deterioration of ecological services by purchasing products from afar, which often occurs without consideration of the ecological consequences of their actions. A stronger response by Governments, public organizations, communities, the private sector, households and individuals thus requires a better understanding of such pressures and concerted action to change them.

2. The goal of the Intergovernmental Platform on Biodiversity and Ecosystem Services is to “strengthen the science-policy interface for biodiversity and ecosystem services for the conservation and sustainable use of biodiversity, long-term human well-being and sustainable development”. To achieve this goal, the Platform has four functions: to catalyse the generation of new knowledge; to produce assessments of existing knowledge; to support policy formulation and implementation; and to build capacities relevant to achieving its goal. These interconnected functions are realized in the Platform’s work programme. A conceptual framework for biodiversity and ecosystems services is required to support the analytical work of the Platform, to guide the development, implementation and evolution of its work programme, and to catalyse a positive transformation in the elements and interlinkages that are the causes of detrimental changes in biodiversity and ecosystems and subsequent loss of their benefits to present and future generations.

3. The conceptual framework set out in figure 1 is a highly simplified model of the complex interactions between the natural world and human societies. The model identifies the main elements, together with their interactions, that are most relevant to the Platform’s goal and should therefore be the focus for assessments and knowledge generation to inform policy and the required capacity-building. The Platform recognizes and considers different knowledge systems, including indigenous and local knowledge systems, which can be complementary to science-based models and can reinforce the delivery of the functions of the Platform. In this sense, the conceptual framework is a tool for the achievement of a shared working understanding across different disciplines, knowledge systems and stakeholders that are expected to be active participants in the Platform. A full alignment between the categories of different knowledge systems or even disciplines is probably unattainable. The Platform’s conceptual framework is intended, however, to be a basic common ground, general and inclusive, for coordinated action towards the achievement of the ultimate goal of the Platform. Within these broad and transcultural categories, different Platform activities may identify more specific subcategories associated with knowledge systems and disciplines relevant to the task at hand, without losing view of their placement within the general conceptual framework.

II. Conceptual framework of the Platform

A. Essential elements of the conceptual framework

4. The Platform’s conceptual framework includes six interlinked elements constituting a social-ecological system that operates at various scales in time and space: nature; nature’s benefits to people; anthropogenic assets; institutions and governance systems, and other indirect drivers of change; direct drivers of change; and good quality of life. The framework is graphically depicted in figure 1, below.

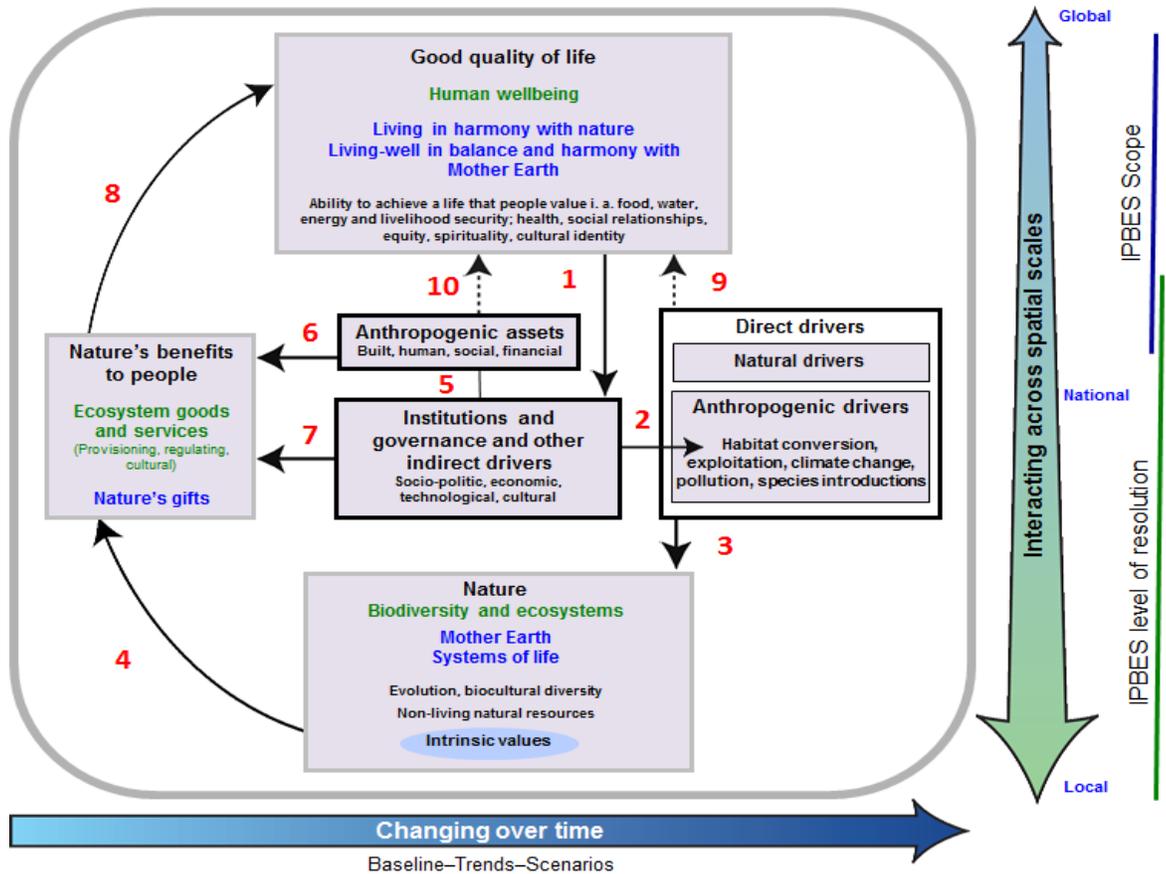


Figure 1: Analytical conceptual framework

Figure 1 demonstrates the main elements and relationships for the conservation and sustainable use of biodiversity and ecosystem services, human well-being and sustainable development. Similar conceptualizations in other knowledge systems include living in harmony with nature and Mother Earth, among others. In the central panel delimited in grey, nature, nature's benefits to people and good quality of life (indicated as black headlines) are inclusive of all these world-views; text in green denotes the concepts of science; and text in blue denotes those of other knowledge systems. Solid arrows in the central panel denote influence between elements; the dotted arrows denote links that are acknowledged as important, but are not the main focus of the Platform. Links indicated by numbered arrow are described in the main text. The thick coloured arrows below and to the right of the central panel indicate different scales of time and space, respectively.

5. "Nature" in the context of the Platform refers to the natural world with an emphasis on biodiversity. Within the context of science, it includes categories such as biodiversity, ecosystems, evolution, the biosphere, humankind's shared evolutionary heritage, and biocultural diversity. Other components of nature which may benefit people, such as deep aquifers, mineral and fossil reserves, wind, solar, geothermal and wave power, are not the focus of the Platform. Within the context of other knowledge systems, nature includes different categories held by indigenous peoples around the world, such as Mother Earth and systems of life, shared by the indigenous people of the South American Andes, and holistic concepts of the land held in the South Pacific islands, which include non-human living organisms, living people, ancestors and deities. Nature contributes to societies through the provision of benefits to people (instrumental and relational values, see below and also Section 6) and has its own intrinsic values, that is, the value inherent to nature, independent of human experience and evaluation and thus beyond the scope of anthropocentric valuation approaches.

6. "Anthropogenic assets" refers to built-up infrastructure, health facilities, knowledge (including indigenous and local knowledge systems and technical or scientific knowledge, as well as formal and non-formal education), technology (both physical objects and procedures), and financial assets, among others. Anthropogenic assets have been highlighted to emphasize that a good life is achieved by a co-production of benefits between nature and societies.

7. “Nature’s benefits to people” refers to all the benefits that humanity - individuals, communities, nations or humanity as a whole- obtains from nature. Ecosystem goods and services –including provisioning, regulating and cultural services, all fall in this category. By definition, all nature’s benefits have anthropocentric value, including instrumental values – the direct and indirect contributions of ecosystem services to a good quality of life, which can be conceived in terms of preference satisfaction– and relational values, which contribute to desirable relationships, such as those among people and between people and nature, as in the notion of “living in harmony with nature”.
8. These values can be expressed in diverse ways. They can be material or non-material, can be experienced in a non-consumptive way or consumed; and they can range from spiritual inspiration to market value. They also include existence value (the satisfaction obtained from knowing that nature continues to be there) and future-oriented values. These future-oriented values include bequest value – in other words, the preservation of nature for future generations – or the option values of biodiversity as a reservoir of yet-to-be discovered uses from known and still unknown species and biological processes, or as a constant source, through evolutionary processes, of novel biological solutions to the challenges of a changing environment. Nature provides a number of benefits to people directly without the intervention of society, for example the production of oxygen and the regulation of the Earth’s temperature by photosynthetic organisms; the regulation of the quantity and quality of water resources by vegetation; coastal protection by coral reefs and mangroves; and the direct provision of food or medicines by wild animals, plants and microorganisms.
9. Many benefits, however, depend on or can be enhanced by the joint contribution of nature and anthropogenic assets (sometimes also called “co-production”). For example, some agricultural goods such as food or fibre crops depend on ecosystem processes such as soil formation, nutrient cycling, or primary production as well as on social intervention such as farm labour, knowledge of genetic variety selection and farming techniques, machinery, storage facilities and transportation.
10. Trade-offs between the beneficial and detrimental effects of organisms and ecosystems are not unusual and they need to be understood within the context of the bundles of multiple effects provided by them within specific contexts. For example, wetland ecosystems provide water purification and flood regulation but they can also be a source of vector-borne disease; large mammalian predators regulate food chains and often have symbolic and aesthetic value, and at the same time they can be a threat to humans and their domestic animals. To acknowledge the fact that what is beneficial, detrimental or value-neutral depends on the perspective of different societies, groups and even individuals. The concept of “nature’s benefits to people” in this context includes disbenefits. This is so to emphasize that, although detrimental effects exist, the main focus of IPBES is on highlighting the positive contributions of nature to a good life. In addition, the relative contribution of nature and anthropogenic assets to a good quality of life varies according to the context. For example, the level at which water filtration by the vegetation and soils of watersheds contributes to quality of life in the form of improved health or reduced treatment costs is based in part on the availability of water filtration by other means, for example, buying bottled water from another location, or treating water in a built facility. If there are no alternatives to watershed filtration by vegetation, then it will contribute strongly to good lives. If there are cost-effective and affordable alternatives, water filtration by vegetation may contribute less.
11. “Drivers of change” refers to all those external factors that affect nature, anthropogenic assets, nature’s benefits to people and a good quality of life. They include institutions and governance systems and other indirect drivers and direct drivers (both natural and anthropogenic).
12. “Institutions and governance systems and other indirect drivers” are the ways in which societies organize themselves, and the resulting influences on other components. They are the underlying causes of environmental change that are generated outside the ecosystem in question (exogenous). Because of their central role, influencing all aspects of human relationships with nature, these are key levers for decision-making. Institutions encompass all formal and informal interactions among stakeholders and social structures that determine how decisions are taken and implemented, how power is exercised, and how responsibilities are distributed. Institutions determine, to various degrees, the access to, and the control, allocation and distribution of components of nature and anthropogenic assets and their benefits to people. Examples of institutions are systems of property and access rights to land (including e.g. public, common-pool, private), legislative arrangements, treaties, informal social norms and rules, and international regimes such as agreements against stratospheric ozone depletion or the protection of endangered species of wild fauna and flora. Economic policies, including macroeconomic, fiscal, monetary or agricultural policies, play a significant role in influencing people’s decisions and behaviour

and the way in which they relate to nature in the pursuit of benefits. Many drivers of human behaviour and preferences, however, which reflect different perspectives on a good quality of life, work largely outside the market system. Formal and informal institutions have different degrees of capacity, legitimacy, inclusion, direction, performance, accountability, fairness, and appropriate scale of operation. They can be organized along a continuum of temporal and geographical scales spanning from global institutions, international treaties, law, and policy, through to small groups and individuals, influencing and being influenced by socio-economic-cultural contexts, including values, traditions, customs, norms and fads. Considering all forms of institutions and decisions, and their role in altering connections within the social-ecological system, helps decision makers identify and test different policy options.

13. “Direct drivers”, both natural and anthropogenic, affect nature directly. “Natural drivers” are those that are not the result of human activities and are beyond human control. These include earthquakes, volcanic eruptions and tsunamis, extreme weather or ocean-related events such as prolonged drought or cold periods, tropical cyclones and floods, glacial lake outburst flows (GLOFs), the El Niño/La Niña Southern Oscillation, and extreme tidal events. The direct anthropogenic drivers are those that are the result of human decisions, namely, of institutions and governance systems and other indirect drivers. Anthropogenic drivers include habitat conversion, exploitation, climate change, pollution and deliberate or unintended species introductions. Some of these drivers, such as pollution, can have negative impacts on nature; others, as in the case of habitat restoration, or the introduction of a natural enemy to combat invasive species, can have positive effects.

14. “Good quality of life” is the achievement of a fulfilled human life. Although the notion of “Good quality of life” varies considerably within and between different societies and cultures, everybody wants to be free from poverty and disease, live better in quality, and have full access to social, economic and human rights. It is a highly value-based and context-dependent state comprising multiple factors such as access to food, water, health, education, good social relationships, physical, energy and livelihood security, equity, cultural identity, material prosperity, spiritual satisfaction, freedom of choice and action. From virtually all standpoints, a good quality of life is multidimensional, having material as well as non-material and spiritual components. Reflecting the diversity of humankind, it is partly dependent on gender, age, and culture, with different societies, and different individuals within societies placing different views on their relationships with nature, the material versus the spiritual domain and the present versus the past or future. Because IPBES aims to embrace different knowledge systems and stakeholders, the consideration of differences and commonalities among these various visions on quality of life is particularly relevant. The three perspectives on “Good quality of life” mentioned in the top box of Figure 1 –Human well-being, Living in harmony with nature and Living in balance and harmony with Mother Earth- illustrate this point.

15. Human well-being is a concept widely used in the international science-policy interface and is often defined as the state of physical and mental health of individuals. Most of the indicators of well-being used by policymakers focus on material wealth. Common examples are income and per capita gross domestic product (GDP). But these tend to capture only a small proportion of the many attributes of the well-being of individuals. Others include shelter, health, nourishment, education, personal security, self-esteem, social relations, and the freedom to participate and have a voice in society. Increasingly, an ethical and ecologically sustainable utilization of nature is incorporated in the concept of human well-being. A number of indicators covering the various aspects of well-being are now available, such as e.g. genuine progress indicator, inclusive wealth index, gross national happiness index, OECD good life indicator, and coefficient of living standard.

16. Other knowledge systems or cultural traditions relate more meaningfully with perspectives on a Good quality of life that show both differences and commonalities with that of human well-being. For example, the concept of Living in harmony with nature –which was initially presented in international discourse at the United Nations in 1982, but then largely ignored until recently– has been adopted as vision by the Convention on Biological Diversity and used in its Strategic Plan for Biodiversity 2011–2020 and the Aichi Targets. This concept highlights the interdependence that exists among human beings, other living species and the elements of the nature. It implies that we should live together with all other organisms even though we need to exploit some of these organisms to a certain degree. This concept was originally proposed to the CBD by Japan, whose culture emphasizes a love of and a respect for nature, of which humans are an inextricable part. The original Japanese term literally means society in symbiosis –or living together- with nature. This meaning of symbiosis is close to that in ecology, in which symbiosis is associated with not only mutualism but also parasitism, highlighting that people should minimize the exploitation and thank the organisms exploited; that is, the utilization of other organisms should be

sustainable. Likewise, Living-well in balance and harmony with Mother Earth is a concept originating in the vision of many indigenous peoples, such as those in the South American Andes, and emphasizes the collective cosmocentric relationships across time among people and between people and Mother Earth. The balance and harmony refer to individuals with respect to a wider human community, including ancestors and descendents, and also between humans and Mother Earth, which is seen as a holistic entity that sustains all living things, and of which humans are an inextricable part, physically and spiritually. In this vision, Mother Earth is entitled with rights as a collective subject of public interest. This concept has been adopted by the Governing Council/Global Ministerial Environment Forum at its first universal session in Nairobi in 2013.

17. It is evident from the previous paragraphs that there are wide overlaps as well as differences in the perspectives on a Good quality of life across various knowledge systems, cultures and societies. Thus, efforts are needed to develop a common ground to understanding how to achieve the various visions of a “Good quality of life” while pursuing the conservation and sustainable use of nature and its benefits to people at different scales. A relevant part of this challenge is the identification of adequate indicators.

B. Essential elements of the conceptual framework Interlinkages between the elements of the conceptual framework

18. A society’s achievement of good quality of life and the vision of what this entails directly influence institutions and governance systems and other indirect drivers (arrow 1 in Figure 1) and, through them, they influence all other elements. For example, to the extent that a good life refers to an individual’s immediate material satisfaction and rights, or to the collective needs and rights of present and future generations, it affects institutions that operate from the subnational scale, such as land and water use rights, pollution control, and traditional arrangements for hunting and extraction, to the global scale, as in subscription to international treaties. Good quality of life, and views thereof, also indirectly shape, via institutions, the ways in which individuals and groups relate to nature. For example, by some nature is viewed as a separate entity to be exploited for the benefit of society, while for others it is a sacred living entity of which humans are only one part.

19. Institutions and governance systems and other indirect drivers affect all elements and are the root causes of the direct anthropogenic drivers that directly affect nature (arrow 2). For example, economic and demographic growth and lifestyle choices (indirect drivers) influence the amount of land that is converted and allocated to food crops, plantations or energy crops; accelerated carbon-based industrial growth over the past two centuries has led to anthropogenic climate change at the global scale; synthetic fertilizer subsidy policies have greatly contributed to the detrimental nutrient loading of freshwater and coastal ecosystems. All of these have strong effects on biodiversity, ecosystem functioning and their derived benefits and, in turn, influence different social arrangements intended to deal with these problems. This may be seen, for example, at the global level, with institutions such as the United Nations Framework Convention on Climate Change, the Convention on Biological Diversity, the Convention on the Conservation of Migratory Species of Wild Animals or, at the national and subnational levels, arrangements in ministries or laws that have effectively contributed to the protection, restoration and sustainable management of biodiversity.

20. Institutions and governance systems and other indirect drivers also affect the interactions and balance between nature (arrows 2, 3, 4) and human assets (arrows 5, 6, 7) in the co-production of nature’s benefits to people, for example by regulating urban sprawl over agricultural or recreational areas. This element also modulates the link between nature’s benefits to people and the achievement of a good quality of life (arrow 8), for example, by different regimes of property and access to land and goods and services; transport and circulation policies; and economic incentives as taxations or subsidies. For each of nature’s benefits that contribute to a good quality of life, the contribution of institutions can be understood in terms of instrumental value, such as access to land that enables the achievement of high human well-being, or in terms of relational values, regimes of property that both represent and allow human lives deemed to be in harmony with nature. The links between nature and anthropogenic assets are not by definition negative and they do not necessarily trade off in every case. Different bio-cultural systems are living examples of how different knowledge systems and physical practices create and maintain biodiversity (e.g. the many cultivated varieties of rice, potatoes, maize and other crops obtained from wild relatives and maintained by ancestral agricultural societies in Africa, Asia and Latin America; the highly diverse meadows and pasturelands maintained by traditional pastoral use in Europe). Many cultures also have spiritual and religious practices such as sacred sites, sacred animals, sacred trees, totems and taboos

which form the basis of nature conservation. For example, in Nigeria and most west and central African countries the python is sacred and must be respected and protected. In Gabon nature is a church, where ceremonies are carried out such as incision. In Nigeria and Gabon, some whole stream catchments are totally protected through taboos. In Ethiopia, forest patches in some areas with traditional practices are also protected by taboos. In Asia, Kasepuhan and Baaduy people in West Java and Dayak people in Borneo protect ancestral forests as a home of deities that protect their life. Many of these cultural systems and practices are under threat from societies and practices outside the traditional systems. Nature and quality of life influence each other. Different societies experience different elements of the natural world (different animals, different vegetation types, different seasonal and decadal cycles); and they do so with different immediacy (from everyday intimate contact to sporadic contact through the mass communication media). These are important factors shaping their perspectives on a good quality of life.

21. Direct drivers cause a change directly in nature (arrow 3) and, as a consequence, in the supply of nature's benefits to people (arrow 4). Natural drivers of change affect nature directly, for example, the impact by a massive meteorite is believed to have triggered one of the mass extinctions of plants and animals in the history of life on Earth. Furthermore, a volcanic eruption can cause ecosystem destruction, at the same time serving as a source of new rock materials for fertile soils. These drivers also affect anthropogenic assets directly (arrow not shown), such as the destruction of housing and supply systems by earthquakes or hurricanes; they can also have direct impacts on quality of life (arrow 9), as may be seen with heat stroke as a result of climate warming or poisoning as a result of pollution. In addition, anthropogenic assets directly affect the possibility of leading a good life through the provision of and access to material wealth, shelter, health, education, satisfactory human relationships, freedom of choice and action, and sense of cultural identity and security (arrow 10). These linkages are acknowledged in Figure 1 but not addressed in depth because they are not the main focus of the Platform.

C. Example: the causes and consequences of declining fisheries

22. There are more than 28,000 fish species recorded in 43 ecoregions in the world's marine ecosystems and probably still many more to be discovered (nature). With a worldwide network of infrastructure such as ports and processing industries, and several million vessels (anthropogenic assets), about 78 million tons of fish are caught every year. Fish are predicted to become one of the most important items in the food supply of over 7 billion people (nature's benefits). This is an important contribution to the animal protein required to achieve food security (good quality of life).

23. Changes in consumption patterns (good quality of life) have brought about an increased demand for fish in the global markets (arrow 1). This, together with the predominance of private short-term interests over collective long-term interests, weak regulation and enforcement of fishing operations, and perverse subsidies for diesel, are indirect drivers (arrow 2) underlying the overexploitation of fisheries by fishing practices (direct drivers) that, because of their technology, spatial scope or time scale of deployment, are destructive to fish populations and their associated ecosystems (arrow 3). The impacts of these practices are combined with those of other direct drivers and include chemical pollution associated with agriculture and aquaculture runoff, the introduction of invasive species, diversions and obstructions of freshwater flows into rivers and estuaries, the mechanical destruction of habitats such as coral reefs and mangroves, and climate and atmosphere change, including ocean warming and acidification (arrow 3).

24. The steep decline in fish populations can dramatically affect nature, in the form of wildlife, ecological food chains, including those of marine mammals and seabirds, and ecosystems from the deep sea to the coast. Increasingly depleted fisheries have also had a negative effect on nature's benefits to people and the good quality of life that many societies derive from them, in the form of decreases in catches, reduced access, and the impaired viability of commercial and recreational fishing fleets and associated industries across the globe (arrows 4, 8). In the case of many small-scale fisheries in less developed countries, this disproportionately affects the poor and women. In some cases it also affects nature and its benefits to people well beyond coastal areas, for example by increasing bushmeat harvest in forest areas and thus affecting populations of wild mammals such as primates, and posing threats to human health (good quality of life).

25. Institutions and governance systems and other indirect drivers at the root of the present crisis (arrows 2, 5, 7) can be mobilized to halt these negative trends and aid the recovery of many depleted marine ecosystems (nature), fisheries (nature's benefits to people) and their associated food security and lifestyles (good quality of life). Examples include strengthening and enforcement of existing fishing regulations, such as the Code of Conduct for Responsible Fisheries of the Food and Agriculture

Organization of the United Nations (FAO), the zoning of the oceans into reserves and areas with different levels of catch effort, and enhanced control of quotas and pollution. In addition, anthropogenic assets could be mobilized towards this end (arrow 6) in the form of the development and implementation of new critical knowledge, such as fishing gear and procedures that minimize by-catch, or a better understanding of the role of no-catch areas in the long-term resilience of exploited fisheries.

D. Application of the conceptual framework across scales

26. The natural and social processes described above occur and interact at different scales of space and time (indicated by the thick arrows around the central panel of Figure 1). Accordingly, the conceptual framework can be applied to different scales of management and policy implementation, scales of ecological processes and scales of potential drivers of change. The evidence so far suggests that causal links between biodiversity and ecosystem processes and benefits to people are strongly scale-dependent. Such a multi-scale and cross-scale perspective also supports the identification of trade-offs within scales, such as between different policy sectors, and across scales, including by limiting the local use of forests for the sake of carbon sequestration goals on the global scale.

27. The Platform will focus on supranational (from subregional to global) geographical scales for assessment. However, the properties and relationships that occur at these coarser spatial scales will, in part, be linked to properties and relationships acting at finer scales, such as national and subnational scales. The Platform's framework can also be applied to support understanding of interactions among components of the social-ecological system over various temporal scales. Some interactions make happen very fast, others more slowly, and there is often a correspondence between the space and time scales. For example, changes in the chemical composition of the atmosphere and the oceans typically occur over centuries or millennia, whereas changes in biodiversity as a consequence of land use at the landscape scale often occur at the scale of years or decades. Processes at one scale often influence, and are influenced by processes that occur at other scales. Because of this, assessments will benefit from contemplating the mutual influences, such as control and propagation, between the scale that is the focus of the assessment and finer and coarser scales.

28. The conceptual framework is also relevant to the analysis of institutional arrangements and ecosystem boundaries at different scales. Understanding the mismatch between ecosystems and institutional arrangements is particularly critical at larger scales where political and administrative boundaries cut across environmental systems, such as the watersheds of major rivers, bio-geo-cultural regions or the territories of nomadic or semi-nomadic peoples. The conceptual framework supports the ability to understand the degree of mismatch between ecosystem units (e.g. watersheds, mountain ranges, forests, landscape units) and institutions in order to make policy-relevant advice at supra- and sub-national scales. For instance, in being responsive to policy and decision making at all levels, IPBES might address institutions at global (e.g., Multilateral Environmental Agreements and their financial mechanisms), regional (e.g., New Partnership for Africa's Development, European Union, Association of Southeast Asian Nations, Mercosur), national (e.g., national environmental protection agencies, ministries of finance, agriculture and health) and subnational/local (e.g., province, state, above-local coherent landscape units, city or village) scales, as well as individuals.

E. Validation in the context of the IPBES conceptual framework

29. Mutual enrichment between different disciplines and knowledge systems is an essential goal of IPBES. Although the stated goal of IPBES explicitly mentions the interface between science and policy, it is understood that the term "science" in this denotes a broader concept that includes contributions not only from natural, social and engineering sciences, but also from knowledge of indigenous and local community stakeholders and practitioners. This poses a challenge on the criteria for validation (i.e. how a portion of knowledge achieves social legitimacy) differ across knowledge systems and across disciplines within science.

30. A report from the IPBES Preparation process (International Science Workshop on Assessments for IPBES) proposes a Multiple Evidence Based approach to address this challenge. Such an approach acknowledges that there are aspects of each knowledge system – or even discipline, for example social and natural sciences- that cannot be fully translated from one into another. It also emphasizes the need for co- production through the engagement different stakeholders, such as scientists from different disciplines, practitioners and disseminators, and indigenous and local knowledge holders. The Multiple Evidence Based approach highlights the complementarity, synergy and cross-fertilization of knowledge systems,

rather than the integration of one system into another. In other words, it highlights the value of letting each knowledge system speak for itself without the necessity for external validation. It also stresses that relevant stakeholders should be involved at all stages in the processes of knowledge generation, assessment, design of policy support tools and capacity building. Such involvement should include the critical steps of definition of goals, scoping of problems and tasks, and examination and adaptation of findings.

31. A crucial challenge is the development of parallel sets of validation criteria, in a way that is perceived as transparent, respectful, credible, and legitimate for different knowledge holders, and is relevant to shared responses in the knowledge-policy interface in pursuit of the common goals of IPBES. Different types of knowledge strongly vary in specificity (from very specific and local to very general and applicable at a global level). The engagement of different knowledge systems that are complementary in terms of scale of focus should lead to better understanding of cross-scale interactions, such as those mentioned in Section 4. In addition, the specificity of the knowledge held by different groups within communities (e.g. gender or occupational specificity), and the importance of explicitly incorporating such groups in the validation process are increasingly recognised.

32. Cross-fertilization and co-production across knowledge systems is relatively common at the local to sub-national scales, but still rare at coarser scales (e.g. regional, global). The development of new ways of achieving this would be a major contribution of the IPBES process. Valuable lessons for the construction of Multiple Evidence Based processes within IPBES can be drawn from existing initiatives such as Japan's Satoyama Satoumi Assessment, the Community Based Monitoring and Information Systems spearheaded by the International Indigenous Forum on Biodiversity, and the assessments carried out by the multiple-stakeholder Arctic Council.

F. Values and valuation in the context of the IPBES conceptual framework

33. The commitment of IPBES to consider multiple knowledge systems necessarily involves the consideration of multiple value systems. For the sake of conceptual clarity, it is necessary to distinguish between various uses of the term 'value' that have sometimes been conflated. In keeping with the general anthropocentric notion of "nature's benefits to people", one might consider a benefit to be ecosystems' contribution to some aspect of people's good quality of life, where a benefit is a perceived thing or experience of value. This use of "value" (assigned value, as "importance, worth, or usefulness") is instrumental or utilitarian and should be distinguished from held (deontological) values or principles (e.g., fairness, truthfulness, fidelity, as in "the values instilled by one's parents"). Both of these notions of value are pertinent to nature, biodiversity and their benefits to people: the held values of individuals and groups are constituents of institutions, particularly formal and informal norms and rules that form the basis of a society's culture; these held values help determine which things a society perceives as being beneficial or useful.

34. Value systems vary within individuals across time or at a given time (e.g., one person's self-oriented utilitarian value system may sometimes conflict with one's principles such as that associated with fairness). They also vary across individuals within groups, and across groups at various scales (some nations tend to be more dominated by value systems that prioritize individual rights and others by value systems that prioritize collective and community-level values). There are many ways of classifying kinds of values, but one major distinction is between instrumental values—which contribute to achieving human well-being, relational values—which contribute to desirable (sought after) relationships (including those between people and nature, as in 'living in harmony with Mother Earth'), and intrinsic value (the value inherent to nature, independent of human experience and evaluation and so beyond the scope of anthropocentric valuation approaches). Within the scope of anthropocentric values, instrumental values are generally associated with economic valuation approaches while relational values depart from economic valuation frameworks.

35. Valuation approaches should match the kinds of values and value systems that dominate for a given stakeholder group (e.g., the government of a province, an indigenous group, a local community), for a given change in a particular set of nature's benefits. Whereas economic valuation may be appropriate for some local and short-lived benefits often mediated by non-distorted and well-functioning markets (such as for commercially produced food), it may not be appropriate for more intangible or longer-term benefits outside the market logic. For instance relational values such as those associated with farming way of life, which is cherished by some farmers as a contributor to cultural heritage and identity, are hardly reducible to a market logic. Additionally, the water purification service that ensures clean water provision can be

framed as an entitlement and not a commodity, thus being beyond the market logic. Intrinsic values, which may be associated for instance with the provision of habitats for species, are often expressed as non-human species' inherent rights to exist. These intrinsic values fall outside the scope of anthropocentric values as defined here. While instrumental values are based on a utilitarian value system that prioritizes measuring preference satisfaction and pricing goods and services, relational values necessitate other valuation approaches that reflect collectively perceived intangible dimensions of the relationship between human good quality of life and nature. Valuation approaches and techniques need to fit with the value-system of people to ensure that all stakeholders' preferences, interests and perceptions of nature are uncovered. Pairing different value systems with different valuation approaches and techniques can provide an integrated value map of nature's benefits. This in turn is necessary to identify and minimize potential value conflicts across stakeholders and thus enable a better understanding of tradeoffs between efficiently allocating scarce benefits and their equitable distribution across stakeholders groups.

36. It should also be noted that in many instances, nature's benefits that have been considered to be in different categories (e.g., instrumental and relational) are fundamentally interlinked (e.g. changes in provisioning services in terms of food production has direct implications for farming ways of life, and vice versa; accordingly contribution to farming ways of life might be better understood as a cultural benefit of food provision than a separate cultural ecosystem service. In the context of such interdependencies, integrative approaches that characterize and value scenarios of how a given set of benefits change are more easily justified than approaches that value every service separately and aggregates across them by addition.

37. Many techniques have been developed to estimate instrumental values from an economic perspective and are used at various scales including the national one. A debate exists to whether these can be aggregated and whether biodiversity per se can or should be valued with such techniques. Evaluating and communicating instrumental values can help spread awareness to policymakers and lay people, and help identify social welfare-enhancing decisions and actions regarding conservation of biodiversity and its benefits to people, especially when dealing at local scales and short time horizons and where the market system is commonplace, but in a number of situations such valuation is neither necessary nor sufficient. Likewise, securing and enhancing the contributions of nature to society will likely benefit from acknowledging and supporting the articulation of relational values often rooted in communal value systems. For example, sacred groves have been protected in India (among other places) for millennia based on value systems that hold as sacred particular pieces of forest, supported by taboos about the use of those forests. Similarly, some communities in India abstain from eating fish from May through August, months that coincide with the breeding season of many harvested species. It is unclear whether the economic valuation of such benefits would be necessary or helpful to maintain these benefits.

38. In summary, values and valuation are critical considerations in the context of biodiversity and ecosystem services. Valuation may help identify decisions that enhance human well-being by supporting the flow of nature's benefits to people. The more that valuation can match the value systems reflected by both formal and informal institutions that underpins the socio-cultural context of social groups, and the more that it can appropriately characterize the relative size and the distribution of costs and benefits of proposed actions or policies, the more useful it is likely to be. Valuation frameworks applicable to diverse socio-cultural contexts would be a major contribution by IPBES to the knowledge-policy interface.

III. Links between the conceptual framework, work programme and functions of the Platform

A. Work programme

39. The Platform's work programme aims to enhance the enabling environment and strengthen the knowledge-policy interface on biodiversity and ecosystem services, and the communication and evaluation of Platform activities.

B. Conceptual framework and the functions of the Platform

40. The Platform's conceptual framework supports the implementation of all four functions of the Platform – knowledge generation, assessments, policy support tools and capacity-building. The conceptual framework helps to ensure coherence and coordination among these four functions. These are best

explained in the operational conceptual model of the Platform depicted in Figure 2, below, which is a schematic representation of the science-policy interface as an operating system.

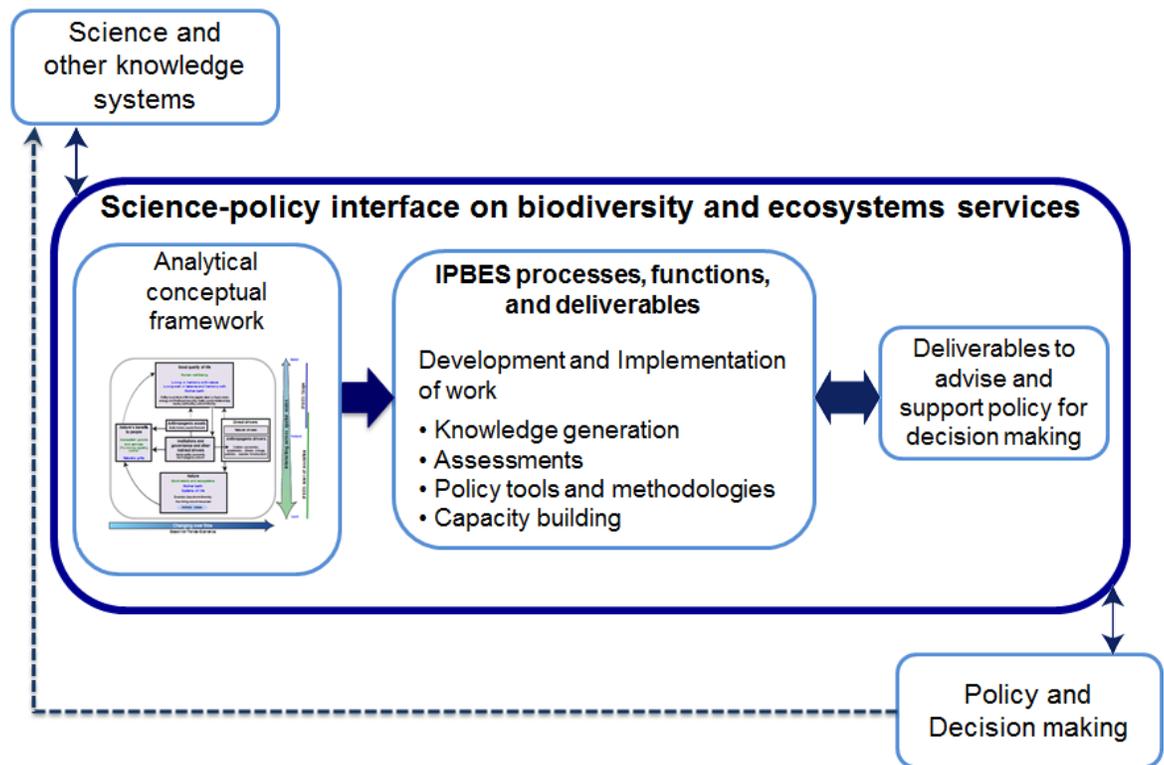


Figure 2: Operational conceptual model of the Platform

Figure 2 describes an interface system interlinking science and other knowledge systems with policy and decision-making through a dynamic process. The figure shows a continuous flow of knowledge from science and other knowledge systems to the interface that is filtered through the analytical conceptual framework, which is shown in greater detail in Figure 1, and processed according to the activities defined by the periodically developed work programmes of the Platform to achieve deliverables. The deliverables are produced in order to influence policy and decision-making through the formulation of multi-optional policy advice. The interface features double-sided (thin and thick) arrows and thus also works in more than one direction. The thick one-sided arrow indicates the analytical conceptual framework influencing Platform processes and functions. The dotted arrow indicates that policy and decision-making in turn influence science and other knowledge systems beyond the agency of the Platform.

C. Science-policy interface

41. The science-policy interface is a complex system interlinking the phase of science and other knowledge systems with the phase of policy and decision-making through a dynamic process. The interface works between the two main phases indicated above. The phase of science and other knowledge systems includes the filtration of raw knowledge and knowledge generation in the form of deliverables to advise and support the phase of policy for decision-making governed by the operative function of the work programmes.

D. Operation of the science-policy interface

42. The interface system is operated by a composite function of the four functions of the Platform (knowledge generation, assessment, policy support and capacity-building) and the conceptual model provides a dynamic process that serves at the same time as the mechanism for the realization of the four functions.

(a) Knowledge generation

43. Although the Platform will not carry out new research to fill knowledge gaps, it will play a vital role in catalysing new research by identifying knowledge gaps and working with partners to prioritize and fill these gaps. The knowledge would come from the scientific community in the natural, social and economic sciences and other knowledge systems.

(b) Assessment

44. Assessments, whether global, regional or thematic, need coherence in their approach, which will provide opportunities for synthesis between the assessments, the scaling up and down of assessments done at different scales, and also comparison among assessments performed at specific scales or on different themes. The analytical conceptual framework set out in figure 1 illustrates the multidisciplinary issues to be assessed, spatially and temporally, within thematic, methodological, regional, subregional and global assessments. The ensemble of assessments will assess the current status, trends and functioning of biodiversity and ecosystems and their benefits to people, and the underlying causes, such as the impacts of institutions, governance and other indirect drivers of change, anthropogenic and natural direct drivers of change, and the anthropogenic assets.

45. The implications of changes in nature's benefits to people for a good quality of life will be assessed, together with changes in the multidimensional value of nature's benefits to people. The conceptual framework incorporates all knowledge systems and beliefs or philosophical values, and ensures coherence among the different assessment activities. A global assessment would be informed and guided by a set of regional and subregional assessments and a set of thematic issues consistently self-assessed within the regional and subregional assessments. The assessment activities described above will also identify what is known and what is unknown and will identify where the generation of new knowledge will strengthen the science-policy interface.

(c) Policy support

46. The policy support would include the identification of policy tools and methodologies, such as the policy process and actors, policy priorities, policy measures, and institutions and organizations, which would help to address the detrimental changes to biodiversity and ecosystem services.

(d) Capacity-building

47. The conceptual framework could support capacity-building in many ways, including by facilitating the engagement of a broad range of stakeholders in the implementation of the work programme in support of national and subnational assessment activities beyond the direct scope of the Platform.

IV. Glossary

Anthropogenic assets: Built-up infrastructure, health facilities, knowledge (including indigenous and local knowledge systems and technical or scientific knowledge, as well as formal and non-formal education), technology (both physical objects and procedures), and financial assets among others.

Baseline: A minimum or starting point with which to compare other information (e.g. for comparisons between past and present or before and after an intervention).

Biocultural diversity: The total sum of the world's differences, irrespective of their origin. The concept encompasses biological diversity at all its levels and cultural diversity in all its manifestations. It is derived from the myriad ways in which humans have interacted with their natural surroundings. [UNESCO 2010]

Biodiversity: The variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems. [UNESCO 2010]

Biosphere: The sum of all the ecosystems of the world. It is both the collection of organisms living on the Earth and the space that they occupy on part of the Earth's crust (the lithosphere), in the oceans (the hydrosphere) and in the atmosphere. The biosphere is all the planet's ecosystems.

Cosmocentric: a vision of reality that places the highest importance or emphasis in the universe or nature, as opposite to and anthropocentric vision, which strongly focuses on humankind as the most important element of existence.

Drivers (of change): All the external factors that cause change in nature, anthropogenic assets, nature's benefits to people and a good quality of life. They include institutions and governance systems and other indirect drivers and direct drivers (both natural and anthropogenic).

Drivers, anthropogenic direct: Elements of direct drivers that are the result of human decisions, namely, of institutions and governance systems and other indirect drivers.

Drivers, direct: Drivers (both natural and anthropogenic) that operate directly on nature (sometimes also called pressures).

Drivers, indirect: Drivers that operate by altering the level or rate of change of one or more direct drivers. [Millennium Ecosystem Assessment 2005]

Drivers, institutions and governance and other indirect: The ways in which societies organize themselves. They are the underlying causes of environmental change that are external (exogenous) to the ecosystem in question [Millennium Ecosystem Assessment 2005].

Drivers, natural direct: Direct drivers that are not the result of human activities and are beyond human control.

Ecosystem functioning: The flow of energy and materials through the arrangement of biotic and abiotic components of an ecosystem. It includes many processes such as biomass production, trophic transfer through plants and animals, nutrient cycling, water dynamics and heat transfer. The concept is used here in the broad sense and it can thus be taken as being synonymous with ecosystem properties or ecosystem structure and function.

Ecosystem services: The benefits (and occasionally disbenefits) that people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; and cultural services such as recreation and sense of place. In the original definition of the Millennium Ecosystem Assessment the concept of "ecosystem goods and services" is synonymous with ecosystem services. Other approaches distinguish "final ecosystem services" that directly deliver welfare gains and/or losses to people through goods from this general term that includes the whole pathway from ecological processes through to final ecosystem services, goods and values to humans.

Ecosystems goods: According to the Millennium Ecosystem Assessment, they are included in the general definition of ecosystem services. According to other approaches, they are objects from ecosystems that people value through experience, use or consumption. The use of this term in the context of this document goes well beyond a narrow definition of goods simply as physical items that are bought and sold in markets, and includes objects that have no market price.

Good quality of life: The achievement of a fulfilled human life, the criteria for which may vary greatly across different societies and groups within societies. It is a context-dependent state of individuals and human groups, comprising aspects such as access to food, water, energy and livelihood security, and also health, good social relationships and equity, security, cultural identity, and freedom of choice and action. “Living in harmony with nature”, “living-well in balance and harmony with Mother Earth” and “human well-being” are examples of different perspectives on good quality of life.

Human well-being: See well-being.

Institutions: Encompass all formal and informal interactions among stakeholders and social structures that determine how decisions are taken and implemented, how power is exercised and how responsibilities are distributed.

Knowledge system: A body of propositions that are adhered to, whether formally or informally, and are routinely used to claim truth.

Level of resolution: Degree of detail or contemplated detail captured in an analysis. A high level of resolution implies a highly detailed analysis, usually associated with finer spatial and temporal scales. A low level of resolution implies a less detailed analysis, usually associated with coarser spatial and temporal scales.

Living in harmony with nature: A perspective on good quality of life based on the interdependence that exists among human beings, other living species and elements of nature. It implies that we should live peacefully alongside all other organisms even though we may need to exploit other organisms to some degree.

Living-well in balance and harmony with Mother Earth: A concept originating in the visions of indigenous peoples worldwide which refers to the broad understanding of the relationships among people and between people and Mother Earth. The concept of living-well refers to: (a) balance and harmony of individuals considering both the material and spiritual dimensions; (b) balance and harmony among individuals taking into account the relationship of individuals with a community; and (c) balance and harmony between human beings and Mother Earth. Living-well means living in balance and harmony with everybody and everything, with the most important aspect being life itself rather than the individual human being. Living-well refers to living in community, in brotherhood, in complementarity; it means a self-sustaining, communitarian and harmonic life.

Mother Earth: An expression used in a number of countries and regions to refer to the planet Earth and the entity that sustains all living things found in nature with which humans have an indivisible, interdependent physical and spiritual relationship.

Nature: The natural world, with particular emphasis on biodiversity.

Nature’s benefits to people: All the benefits (and occasionally disbenefits) that humanity obtains from Nature.

Policy tools: Instruments used by Governments to implement their policies. Environmental policies, for example, could be implemented through tools such as economic incentives and market-based instruments including taxes and tax exemptions, tradeable permits and fees. Such tools can be very effective in encouraging compliance with environmental policies.

Scenarios: Plausible alternative future situations based on a particular set of assumptions. Scenarios are associated with lower certainty than projections, forecasts or predictions. For example, socio-economic scenarios are frequently based on storylines describing several alternative, plausible trajectories of population growth, economic growth and per capita consumption, among other things. These are commonly coupled with projections of impacts on biodiversity and ecosystem services based on more quantitative models. The term “scenarios” is sometimes used to describe the outcomes of socio-economic scenarios coupled with models of impacts, owing to the high uncertainty associated with the socio-economic trajectories.

Social-ecological system: A bio-geo-physical unit and its associated social actors and institutions. Social-ecological systems are complex and adaptive and are delimited by spatial or functional boundaries surrounding particular ecosystems and their specific context.

Systems of life: The complex, integrated interactions of living beings (including humans), such as the cultural attributes of communities, socio-economic conditions and biophysical variables.

Trend: The general direction in which the structure or dynamics of a system tends to change, even if individual observations vary.

Values: Those actions and objects that are worthy or important (sometimes values may also refer to moral principles).

Values, bequest: The satisfaction of preserving the option of future generations to enjoy nature's benefits.

Values, existence: The satisfaction obtained from knowing that nature endures.

Values, instrumental: The direct and indirect contributions of nature's benefits to the achievement of a good quality of life. These values are conceived in terms of preference satisfaction.

Values, intrinsic: The values inherent to nature, independent of human experience and evaluation, and therefore beyond the scope of anthropocentric valuation approaches.

Values, option: The potential ability to use some nature's benefits in the future, although they are not currently used or the likelihood for their future use is low. It represents the willingness to preserve an option for the future enjoyment of nature's benefits.

Values, relational: The values that contribute to desirable relationships, such as those among people and between people and nature, as in "Living in harmony with nature".

Value systems: Set of values according to which people, societies and organizations regulate their behaviour. More specifically, the term refers to those structures in which the priorities assigned to various values are stable and predictable. Value systems can be identified in both individuals and social groups and thus families, stakeholder groups and ethnic groups may be characterized by specific value systems.

Well-being: A perspective on a good life that comprises access to basic materials for a good life, freedom and choice, health and physical well-being, good social relations, security, peace of mind and spiritual experience.

V. Sources

- Agarwala, M. 2012. *Inclusive wealth report 2012*. Cambridge: Cambridge University Press.
- Arrow, K. J., Dasgupta, P., Goulder, L. H., Mumford, K. J. and Oleson, K. 2012. Sustainability and the measurement of wealth. *Environment and Development Economics*, 17(3), pp. 317–353.
- Asah, S., Blahna, D. and Ryan, C. 2012. Involving forest communities in identifying and constructing ecosystem services: millennium assessment and place specificity. *Journal of Forestry*, 110 (3), pp. 149-156.
- Balmford, A. and Whitten, T. 2003. Who should pay for tropical conservation, and how could the costs be met? *Oryx*, 37 (02), pp. 238-250.
- Barrett, C., Travis, A. and Dasgupta, P. 2011. On biodiversity conservation and poverty traps. *Proceedings of the National Academy of Sciences*, 108 (34), pp. 13907-13912.
- Bateman, I., Harwood, A., Mace, G., Watson, R., Abson, D., Andrews, B., Binner, A., Crowe, A., Day, B., Dugdale, S. et al. 2013. Bringing ecosystem services into economic decision-making: land use in the United Kingdom. *Science*, 341 (6141), pp. 45-50.
- Bandot, B. 2012. Approaching harmony with nature, In: Nicklin, S. and Cornwell, B. 2012. *Future Perfect*. England: Tudor Rose.
- Berkes, F., Folke, C. and Gadgil, M. 1994. Traditional ecological knowledge, biodiversity, resilience and sustainability. *Biodiversity Conservation – Ecology, Economy & Environment*, 4, pp. 269-287.
- Brashares, J., Arcese, P., Sam, M., Coppolillo, P., Sinclair, A. and Balmford, A. 2004. Bushmeat hunting, wildlife declines, and fish supply in West Africa. *Science*, 306 (5699), pp. 1180-1183.
- Brondizio, E. S., Ostrom, E. and Young, O. 2009. Connectivity and the Governance of Multilevel Socio-ecological Systems: The Role of Social Capital. *Annual Review of Environment and Resources*, 34, pp. 253–78.
- Brown, T. 1984. The concept of value in resource allocation. *Land Economics*, 60 (3), pp. 231-246.
- Carpenter, S., Mooney, H., Agard, J., Capistrano, D., Defries, R., Diaz, S., Dietz, T., Duraiappah, A., Oteng-Yeboah, A., Pereira, H. and Others. 2009. Science for managing ecosystem services: Beyond the Millennium Ecosystem Assessment. *Proceedings of the National Academy of Sciences*, 106 (5), pp. 1305-1312.
- Chan, K., Guerry, A., Balvanera, P., Klain, S., Satterfield, T., Basurto, X., Bostrom, A., Chuenpagdee, R., Gould, R., Halpern, B. and Others. 2012. Where are cultural and social in ecosystem services? A framework for constructive engagement. *BioScience*, 62 (8), pp. 744-756.
- Chan, K., Satterfield, T. and Goldstein, J. 2012. Rethinking ecosystem services to better address and navigate cultural values. *Ecological Economics*, 74, pp. 8-18.
- Cowling, R., Egoh, B., Knight, A., O'farrell, P., Reyers, B., Rouget, M., Roux, D., Welz, A. and Wilhelm-Rechman, A. 2008. An operational model for mainstreaming ecosystem services for implementation. *Proceedings of the National Academy of Sciences*, 105 (28), pp. 9483-9488.
- Daniel, T., Muhar, A., Arnberger, A., Aznar, O., Boyd, J., Chan, K., Costanza, R., Elmqvist, T., Flint, C., Gobster, P. and Others. 2012. Contributions of cultural services to the ecosystem services agenda. *Proceedings of the National Academy of Sciences*, 109 (23), pp. 8812-8819.
- Díaz, S. and Cabido, M. 2001. Vive la différence: plant functional diversity matters to ecosystem processes. *Trends in Ecology & Evolution*, 16 (11), pp. 646-655.
- Diaz, S., Quétier, F., Caceres, D.M., Trainor, S.F., Perez-Harguindeguy, N., Bret-Harte, M.S., Finegan, B., Pena-Claros, M. and Poorter, L. 2011. Linking functional diversity and social actor strategies in a framework for interdisciplinary analysis of nature's benefits to society. 2011. *Proceedings of the National Academy of Sciences of the United States of America*, 108 (3), pp. 895-902.
- Dietz, T., Fitzgerald, A., and Shwom, R. 2005. Environmental Values. *Annual Review of Environment and Resources*, 30 (1), pp. 335–372.

- Duraiappah, A. and Rogers, D. 2011. The Intergovernmental Platform on Biodiversity and Ecosystem Services: opportunities for the social sciences. *Innovation: The European Journal of Social Science Research*, 24 (3), pp. 217-224.
- Duraiappah, A. 2012. Satoyama-Satoumi Ecosystems and Human Well-Being: Socio-Ecological Production Landscapes of Japan. United Nations University Press.
- Duraiappah, A. 2011. Ecosystem services and human well-being: Do global findings make any sense?. *BioScience*, 61 (1), pp. 7-8.
- Faith, D., Magallon, S., Hendry, A., Conti, E., Yahara, T., and Donoghue, M. 2010. Ecosystem services: an evolutionary perspective on the links between biodiversity and human well-being. *Current Opinion in Environmental Sustainability*, 2 (1), pp. 66-74.
- Garmendia, E. and Pascual, U. 2013. A justice critique of environmental valuation for ecosystem governance. In: Sikor, T. eds. 2013. *Justices and Injustices of Ecosystem Services*. London: Routledge.
- Gregory, R., Failing, L., Harstone, M., Long, G., Mcdaniels, T. and Ohlson, D. 2012. Structured Decision Making. Hoboken: Wiley.
- Ishak, I. and Alias, R. 2005. Designing a Strategic Information Systems Planning Methodology for Malaysian Institutes of Higher Learning (isp- ipta). *Information System*, 6(1), pp. 325-331.
- Jahn, T. et al. 2009. Understanding Social-Ecological Systems: Frontier Research for Sustainable Development. Implications for European Research Policy, Institute for Social-Ecological Research. Available from http://ec.europa.eu/research/sd/conference/2009/papers/7/thomas_jahn_socio-ecological_systems.pdf.
- Harrington, R., Anton, C., Dawson, T., De Bello, F., Feld, C., Haslett, J., Kluvankova-Oravska, T., Kontogianni, A., Lavorel, S., Luck, G. and Others. 2010. Ecosystem services and biodiversity conservation: concepts and a glossary. *Biodiversity and Conservation*, 19 (10), pp. 2773-2790.
- Jax, K., Barton, D., Chan, K., De Groot, R., Doyle, U., Eser, U., Görg, C., Gómez-Baggethun, E., Griewald, Y., Haber, W. and Others. 2013. Ecosystem services and ethics. *Ecological Economics*, 93, pp. 260-268.
- Larigauderie, A., Prieur-Richard, A., Mace, G., Lonsdale, M., Mooney, H., Brussaard, L., Cooper, D., Cramer, W., Daszak, P., Díaz, S and Others. 2012. Biodiversity and ecosystem services science for a sustainable planet: The DIVERSITAS vision for 2012--20. *Current opinion in environmental sustainability*, 4 (1), pp. 101-105.
- Lenzer, M., Moran, D., Kanemoto, K., Foran, B., Lobefaro, L. and Geschke, A. 2012. International trade drivers biodiversity threats in developing nations. *Nature*, 486, pp. 109-112.
- Liu, S., Gallois, C. and Volčič, Z. 2011. Introducing intercultural communication. London: SAGE.
- Luck, G., Harrington, R., Harrison, P., Kremen, C., Berry, P., Bugter, R., Dawson, T., De Bello, F., Diaz, S., Feld, C. and Others. 2009. Quantifying the contribution of organisms to the provision of ecosystem services. *Bioscience*, 59 (3), pp. 223-235.
- Mace, G., Norris, K. and Fitter, A. 2012. Biodiversity and ecosystem services: a multilayered relationship. *Trends in Ecology & Evolution*, 27 (1), pp. 19-26.
- Millennium Ecosystem Assessment. 2005. Ecosystems and human well-being: biodiversity synthesis. World Resources Institute, Washington, DC.
- Ostrom, E. 2005. *Understanding institutional diversity*. Princeton: Princeton University Press.
- Pascual, U., Muradian, R., Brander, L., Gómez-Baggethun, E., Martín-López, M, Verma, M., Armsworth, P., Christie, M., Cornelissen, H., Eppink, F., Farley, J., Loomis, J., Pearson, L., Perrings, C., Polasky, S. 2010. The economics of valuing ecosystem services and biodiversity. In: Kumar, P. eds. 2010. *The Economics of Ecosystems and Biodiversity Ecological and Economic Foundations*. pp. 183-256. Earthscan.
- Pereira, H., Leadley, P., Proença, V., Alkemade, R., Scharlemann, J., Fernandez-Manjarrés, J., Araújo, M., Balvanera, P., Biggs, R., Cheung, W. and Others. 2010. Scenarios for global biodiversity in the 21st century. *Science*, 330 (6010), pp. 1496-1501.

- Perrings, C., Duraiappah, A., Larigauderie, A. and Mooney, H. 2011. The biodiversity and ecosystem services science-policy interface. *Science*, 331 (6021), pp. 1139-1140.
- Plurinational State of Bolivia. 2013. Submission by the Plurinational State of Bolivia on the conceptual framework of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Available from www.ipbes.net/images/documents/Bolivia_comments%20on%20background%20document%20on%20IPBES%20Conceptual%20Framework.pdf.
- Reid, W., et al. 2006. Bridging Scales and Knowledge Systems: Concepts and Applications in Ecosystem Assessment. Washington D.C. Island Press.
- Reyers B., Polasky, S., Tallis, H., Mooney, H.A. and Larigauderie, A. 2012. Finding common ground for biodiversity and ecosystem services. *BioScience*, 62, pp. 503-7.
- Reyers, B., O'Farrell, P.J., Cowling, R.M., Egoh, B.N., Le Maitre, D. C. and Vlok, J. H. J. 2009. Ecosystem services, land-cover change, and stakeholders: finding a sustainable foothold for a semiarid biodiversity hotspot. *Ecology and Society*, 14(1), pp. 38. Published under the license by the Resilience Alliance.
- Rohan, M. J. 2000. A rose by any name? The values construct. *Personality and Social Psychology Review*, 4 (3): 255-277.
- Sagoff, M. 1998. Aggregation and deliberation in valuing environmental public goods:: A look beyond contingent pricing. *Ecological Economics*, 24 (2), pp. 213-230.
- Satterfield, T., Gregory, R., Klain, S., Roberts, M. and Chan, K. 2013. Culture, intangibles and metrics in environmental management. *Journal of environmental management*, 117, pp. 103-114.
- Secretariat of the Convention on Biological Diversity. 2010. Global Biodiversity Outlook 3. Montréal. Available from <http://www.cbd.int/doc/publications/gbo/gbo3-final-en.pdf>.
- Secretariat of the Convention on Biological Diversity. 2010. The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets (Decision X/2, of 29 October 2010, of the Conference of the Parties to the Convention on Biological Diversity at its tenth meeting). Available from www.cbd.int/decision/cop/default.shtml?id=12268/.
- Sen, A. 2009. *The idea of justice*. The Belknap Press of Harvard University Press, Cambridge, Massachusetts.
- Smith, L., Case, J., Smith, H., Harwell, L. and Summers, J. 2013. Relating ecosystem services to domains of human well-being: Foundation for a US index. *Ecological Indicators*, 28, pp. 79-90.
- Thaman, R.R. 2009. Sustainability. In Gillespie, R.G. and Clague (eds.). *Encyclopedia of Islands*, University of California Press, Berkeley, pp. 888-896.
- Tengö, M., Malmer, P., Brondizio, E., Elmqvist, T. and Spierenburg, M. 2013. The Multiple Evidence Base as a framework for connecting diverse knowledge systems in IPBES. Discussion paper 2013-06-05. Stockholm Resilience Centre, Stockholm University, Sweden.
- Trainor, S. 2006. Realms of value: Conflicting natural resource values and incommensurability. *Environmental Values*, pp. 3-29.
- UKNEA 2012: The UK National Ecosystem Assessment. 2011. Synthesis of the Key Findings. UNEP-WCMC, Cambridge.
- UNEP/GC.27/17 (Nairobi, 2013). Decision 27/8: Green economy in the context of sustainable development and poverty eradication.
- UNEP/CBD/AHTEG-SP-Ind/1/3. Report of the Ad Hoc Technical Expert Group on Indicators for the Strategic Plan for Biodiversity 2011-2020.
- UNEP/IPBES.MI/1/INF/11 (Nairobi 2011): Considering the generation of knowledge function of IPBES: Recommendations from a meeting of scientific organizations interested in IPBES convened by ICSU, and hosted by UNESCO (Paris, France, 10 June 2011).

- UNEP/IPBES.MI/1/INF/12 (Nairobi 2011): Report of an international science workshop on assessments for an intergovernmental science-policy platform on biodiversity and ecosystem services, held in Tokyo from 25 to 29 July 2011.
- UNEP/IPBES.MI/2/INF/10 (Panama 2012): Report of the scientific workshop on assessments for an intergovernmental science-policy platform on biodiversity and ecosystem services.
- UNEP/IPBES.MI/2/INF/11 (Panama 2012): Report of the workshop on the theme “Considering further the intergovernmental science-policy platform on biodiversity and ecosystem services knowledge-generation function.
- United Nations (UN). 2012. United Nations Conference on Sustainable Development, The future we want. Available from www.uncsd2012.org/content/documents/727The%20Future%20We%20Want%2019%20June%201230pm.pdf (accessed 1 October 2013).
- United Nations (UN). 2009. General Assembly Resolution 63/278 of 22 April 2009, by which the Assembly designated 22 April “International Mother Earth Day” (A/RES/63/278).
- United Nations (UN). 1982. World Charter for Nature, adopted by the General Assembly, 48th plenary meeting, 28 October 1982, A/Res/37/7. (<http://www.un.org/documents/ga/res/37/a37r007.htm>)
- United Nations (UN). UN World Ocean Assessment (<http://www.worldoceanassessment.org/>) (accessed November 2013).
- United Nations Educational, Scientific and Cultural Organization (UNESCO), 2010. A proposed joint programme of work on biological and cultural diversity lead by the secretariat of the Convention on Biodiversity and UNESCO, working document prepared for the International Conference on Biological and Cultural Diversity: Diversity for Development – Development for Diversity, Montreal, Canada, June 2010. Available from www.unesco.org/mab/doc/iyb/icbcd_working_doc.pdf.
- Universcience Glossary. Available from www.cite-sciences.fr/en/lexique/definition/c/1248117917733/-/p/1239026795199/ (accessed September 2013).
- Wegner, G. and Pascual, U. 2011. Cost-benefit analysis in the context of ecosystem services for human well-being: A multidisciplinary critique. *Global Environmental Change*, 21 (2), pp. 492-504.
- World Bank. 2012. Hidden harvest: the global contribution of capture fisheries. Agriculture and Rural Development Series, ISBN: 978-0-8213-8844-0.

VI. Acknowledgements

The process that led to the preparation of this document greatly benefited from the contribution of participants from the following workshops: (a) Informal expert workshop on main issues relating to the development of a conceptual framework for the Platform, held from 27 to 29 October 2012 in Paris, France; (b) International Expert and Stakeholder Workshop on The Contribution of Indigenous and Local Knowledge Systems to IPBES: Building Synergies with Science held from 9-11 June 2013, Tokyo, Japan; and (c) Expert Workshop on the Conceptual Framework for IPBES, 25 – 26 August 2013, Cape Town, South Africa. The participants names are provided below:

Rashad Allahverdiyev, Edward Amankwah, Salvatore Arico, T. Stanley Asah, Zemedede Asfaw, Neville Ash, Vital Bambanze, Brigitte Baptist, Gabor Bartus, Fikret Berkes, Anete Berzina, Meriem Bouamrane, Elva G. Briones, Eduardo S. Brondizio, Thomas Brooks, Anatheia Brooks L, Jorge Caillaux, Jocelyn (Joji) Carino, Frederic Castell, Lameck Chagonda, Kai Chan, Youn Yeo-Chang, Pierre Commenville, Manuela Carneiro Cunha, Anantha Kumar Duraiappah, Pablo B. Escobar- Eyzaguirre, Pierre Failler, Carlos Alberto Rodriguez Fernández, Viviana Elsa Figueroa, Markus Fischer, Haripriya Gundimeda, Shizuka Hashimoto, Rosemary Hill, Hindou Oumarou Ibrahim, Mohamud Jama, Gretchen Kalonji, Thomas Koetz, Anne Larigauderie, Natasha Lazic, Dan Leskien, Gabriela Lichtenstein, Daniela Paola Limache de la Fuente, Monika G. MacDevette, Georgina Mace, William Armand Mala, Wadzanayi Mandivenyi, Berta Martín-López, Piotr Matczak, Carmel Mbizvo, Jean Paul Metzger, Henrik Moller, Harold A. Mooney, Nissrine El-ghazel Mouawad, Peter Mumby, Harini Nagendra, Fumiko Nakao, Douglas Nakashima, Carsten Nesshoever, Michiko Okumura, Diego Pacheco, Unai Pascual, Rafael Almonte Perdomo, Caroline Petersen , Belinda Reyers, Marie Roué, Jennifer Rubis, Osamu Saito, Jan Salick, Robert John Scholes, Maria Schultz, Nalini Sharma, Polina Shulbaeva, Kerry Sink, Peggy Smith, Herwasono Soedjito, Marja Spienburg, Rashid Sumaila, Kazuhiko Takeuchi, Heather Tallis, Yu Tian, Prasert Trakansuphakon, Gemedo Dalle Tussie , Dr. Madhu Verma, Christina Von-Fustenberg, Jun Wu, Bertie Moses Xavier, Hoda Yacoub, Tetsukazu Yahara, Lun Yin, Diana Zlatanova