Glossary of working definitions for Expert Group Meeting on Biodiversity for Poverty Eradication and Development

1 Proposed definitions of biodiversity

The SCBD wanted to expand upon the Convention's definition of biodiversity by including the interdependency of humankind and biodiversity:

Taking up the first part of the slogan of the Convention on Biological Diversity's (CBD) international year of biodiversity (2010) it could also be said that « biodiversity is life !». Biological diversity is the adaptive potential of the range of ecological complexes or systems that sustain the variety and variability of life. Today, the diversity of habitats and species is, also at different levels, the result from local to global coevolution, the outcome historically and geographically determined by a process of combination and interference patterns between human occupation of the territory or use of biological resources and ecological functioning[1]. The second part of the slogan of the IYB emphasized this interdependency between humankind and biodiversity: « biodiversity is our life ». Biodiversity is a "life insurance", a product of natural evolution and gradually modified by humanity that must be managed to maintain or restore the availability of ecosystem services it freely provides for our well-being.

Another complimentary definition of biodiversity can be found in Smith (2010)[2]:

The CBD defines biodiversity as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic systems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems" (article 2).

It is worth-noting that there are many definitions of biodiversity. They deal with different organisational levels (genetic, species, ecosystems), different types of ecosystems and species (wild and domesticated), different spatial scales and one or both of the key elements 'richness' and 'abundance'[3] (Purvis and Hector 2000).

Biodiversity can be measured in many ways by using different indicators: •

- Ecosystem diversity refers to the diversity of a place at the level of ecosystems. Ex; Forest Extend, Protected areas extend...
- Species diversity. Taxonomic richness of a geographic area, with some reference to a temporal scale (e.g. Species Richness, Simpson Index, Shannon index, Mean Species Abundance, Living Planet Index, Red List Index, etc.)
- Genetic diversity, the total number of genetic characteristics in the genetic makeup of a species.

Different indicators will tell a different story or view on the loss or restoration of different types of biodiversity. The 2010 Biodiversity Indicators Partnership (see www.twentyten.net//indicators) has a wealth of more detailed information in this regard.

1 adapted from Babin, D., Lefeuvre, J.C. & Weber, J., 2005. Un concours "jeunes chercheurs" sur la biodiversité: pour quoi faire? Natures sciences sociétés, 13(3), pp.302-305.
2 Smith, J. et al., 2010. Linking the Thematic Programmes of Work of the Convention on Biological Diversity (CBD) to Poverty Reduction and Development, Montreal, Canada.

Specific comments from Experts regarding the proposed definition of biodiversity included:

Mrs Teran Maigua: FOR INDIGENOUS PEOPLES, BIODIVERSITY IS LIFE IN WHICH ALL THE ELEMENTS INCLUDING MAN ARE INTER RELATED

2 Proposed definitions of poverty

Comments from Mr.Faizi mentioned that only using the World Bank and The OECD's definitions of poverty were too limiting, therefore, perhaps a more inclusive definition could be taken from Smith (2010):

When defining poverty, a distinction should be made between the traditional uni-dimensional approach and more recent multidimensional ones. Historically, poverty has been related to income, which still remains the core of the concept today. It has evolved from the 19th century idea about 'subsistence needs'—what a person needs to survive, to the mid-20th century conceptualization of lacking 'basic needs', extending the subsistence idea by also including basic facilities and services such as healthcare, sanitation and education, to the late 20th century understanding of poverty as 'relative deprivation', including of income and other resources, as well as social conditions. According to Sen (1999)[4], poverty is an undesired state of human well-being, measured as a score below a certain level of human well-being. e poor generally lack a number of human well-being elements, such as income, food, education, access to land, health and longevity, justice, family and community support, credit and other productive resources, a voice in institutions, and access to opportunity. Being poor means having an income level that does not allow an individual to cover certain basic necessities, taking into account the circumstances and social requirements of the environment and society. The most basic necessity is food.

Recent socio-economic literature seems to agree that poverty is multidimensional and region-specific. What is considered as 'poverty' varies considerably between regions and between individuals, urban and rural areas, and between ecosystems. People in forest areas, for example, often do not need to spend up to a dollar a day to have a decent meal or acquire subsistence requirements. There is mounting evidence that the biodiversity around them is in itself a source of nourishment that people in other ecosystems pay dearly for. Despite the difficulty in deciding its meaning, frameworks have been developed to help researchers identify the poor and the causes of poverty. The most widely used frameworks which form the basis of this analysis are the Development Assistance Committee (DAC) guidelines on poverty reduction[5],

Livelihood assets approach five categories of capital[6], Millennium Development Goals (MDGs), World Bank Poverty Reduction Framework, and Millennium Ecosystem Assessment (see Table 1).These frameworks were chosen not only because they capture the multidimensionality of poverty, but they are also recognized by a large constituency of multilateral and bilateral agencies and are widely used to define and classify poverty and poverty reduction efforts.

4 Sen, A., 2010. L'Idée de justices, Paris: Flammarion.
5 OECD, 2001. DAC Guidelines on Poverty Reduction. , 86(17), p.127. Available at: www.oecd.org/dataoecd/47/14/2672735.pdf.
6 Carney, D., 1998. Implementing the sustainable livelyhoods approach. In D. Carney, ed. Sustainable rural livelihoods: What contribution can we make? London, UK: Department for International Development.

Table 1 Internationally recognized definitions and frameworks for poverty and poverty reduction (from (Smith et al. 2010)**)**

Livelihood Assets/Five Categories of Capital (Carney et al. 1998)	**Sen's Capabilities Approach (Sen 1999)**	**Millennium Development Goals (MDGs) (UN 2000)**	**World Bank Poverty Reduction Framework (World Bank 2001)**	**Development Assistance Committee (DAC) Guidelines on poverty reduction (OECD 2001)**	**Human Rights Approach to Poverty Reduction Oxfam**	**Millennium Ecosystem Assessment: Human Well-being and Poverty Reduction (MA 2005)**	**General thematic categories adopted in**
		MDG7 (Environmental sustainability)		**Environment** (cross-cutting issue)	**Right to a sustainable existence**	**Basic material for a good life**	***Environmental resources (provisioning services)***
	Good health	**MDGs 4, 5 and 6** (Health)		**Human** (Health, Education, Nutrition)		**Health**	***Health***
		MDG 1 (Eradicate hunger and poverty) **MDG 8** (Develop a Global Partnerships for Development)	**Facilitating empowerment**			**Freedom of choice and actions**	***Food and Water***
Human capital Physical capital Financial capital	**Economic facilities Access to education**	**MDG 2** (Education)	**Promoting opportunity**	**Economic** (Consumption, Income, Assets) **Socio-cultural** (Status and Dignity) **Gender** (cross-cutting issue)		**Good social relations**	***Education & Ability to generate income***
Social capital	**Political freedom Basic human rights**	**MDG 3** (Gender equality and empowerment)		**Political capabilities** (human rights, infuence over public policies and freedom) **Gender** (cross-cutting issue)	**Right to social and political participation Right to identity Right to life and safety Right to basic social services**		***Rights & Freedoms***
Natural capital			**Enhancing security**	**Prospective** (Security and vulnerability)		**Security**	***Security***

Specific comments from Experts regarding the proposed definition of poverty included:

Mrs Teran Maigua:

IT WILL BE IMPORTANT TO ANALYZE THE CONCEPT OF POVERTY FROM THE INDIGENOUS PEOPLES PERSPECTIVE AND FOUND THE HISTORICAL REASON THAT MADE IS POOR PEOPLE. NOWADAYS IT IS FINDAMENTAL TO HAVE A SUSTAINABLE DEVELOPMENT WITH IDENTITY.

Poverty is also a:
LACK OF ACCES TO LAND,
LACK OF ACCES TO A DECENT HOUSING,
LACK OF ACCES TO SEEDS, WATER AND RESOURCES,
LACK OF ACCES TO ALL LEVELS OF EDUCATION: FORMAL AND INFORMAL,
LACK OF ACCES TO BUSSINESS,
LACK OF FREEDOM TO EXERCISE THEIR HUMAN RIGHTS,
LACK OF RESPECT AND CONSIDERATION OF THE CULTURAL DIVERSITY,
LACK OF THE OPPORTUNITY TO BE HAPPY,
LACK OF IP INCLUSION IN THE COUNTRY DEVELOPMENT,
LACK OF EFFECTIVE AND FULL PARTICIPATION IN THE POLICIES DESIGN AND IMPLEMENTATION

Mr. Bhandari proposed various different definitions of poverty:

"Poverty is ... multi-dimensional, encompassing material deprivation, the lack of access to other basic needs (education, health, nutrition and food security), the absence of political autonomy and empowerment, as well as the lack of freedom of choice and social inequality"[7].

"Poor people, especially those living in areas with low agricultural productivity, depend heavily and directly on genetic, species and ecosystem biodiversity to support their livelihoods"[8].

"Despite a limited evidence base it is clear from these reviews that a) the poor depend disproportionately on biodiversity for their subsistence needs—both in terms of income and insurance against risk, and b) biodiversity conservation can be a route out of poverty under some circumstances....Recognition of the link between the status of biodiversity and the fate of poor people implies that biodiversity should be a priority in international efforts to address poverty reduction. However, the accessible nature of biodiversity that makes it so important to poor people—the fact that ecosystem services and biodiversity resources are public good—ironically also means that it is under-valued, if valued at all, in national economies"[9].

"Poverty is 'a pronounced deprivation in wellbeing…. To be poor is to be hungry, to lack shelter and clothing, to be sick and not cared for, to be illiterate and not schooled. But for poor people, living in poverty is more than this. Poor people are particularly vulnerable to adverse events outside their control.

7 Vira, Bhaskar and Kontoleon, Andreas (2010) Dependence of the poor on biodiversity: which poor, what biodiversity? Paper prepared for the CPRC International Conference 2010, Manchester, September 8-10, 2010. http://www.chronicpoverty.org/uploads/publication_files/vira_kontoleon_biodiversity.pdf

8 European Commission; DFID and IUCN (2009) Biodiversity IN Development, Biodiversity Brief 1, All Biodiversity Development Project (BDP) documents can be found on the website: http://europa.eu.int/comm/development/sector/ http://www.povertyandconservation.info/docs/20090820-bb01-eng_en.pdf

9Convention on Biological Diversity (2010) Linking Biodiversity Conservation and Poverty Alleviation: A State of Knowledge Review, CBD Technical Series No: 55,commissioned by the International Institute for Environment and Development (IIED), Montreal, Canada http://www.cbd.int/doc/publications/cbd-ts-55-en.pdf

They are often treated badly by the institutions of state and society and excluded from voice and power in these institutions"[10].

"My poverty is having no land, buffalo, hoe, rake, plow, transport, mosquito net, cooking pots or even plates to eat from and spoon and fork to pick up the food. This means I cannot possibly get enough food to eat because I lack the things I need to keep me alive for much longer"[11].

Who are the poor and what is poverty - (Descriptively, according to the poor)?

- Cook a meal, miss a meal…borrow a kilo of rice, then all over again, cook a meal, miss a meal.
- Spend the rest of the day and the night with us and count how many houses have fires in their kitchens. That is poverty.
- Having to work for a stomach measuring just one span, even when you are unwell, that is poverty!
- After giving the children their meals, mothers go hungry.
- No clothes to wear, no oil, perishing under the burden of our debts, no health facilities. And so, poverty is a heap of deprivations.
- Poverty is having to beg others for money.
- Poverty is when family peace is destroyed.
- Being ignored and put down by others[12]

10 World Bank (2001) World Development Report 2000/2001: Attacking Poverty, World Bank, Washington, DC.

11 Asian Development Bank (2001) Participatory poverty assessment in Cambodia, Asian Development Bank, Manila, Philippines http://www.adb.org/documents/books/participatory_poverty/Participatory_Poverty.pdf

12 Asian Development Bank (2007) Learning from the Poor: Findings from Participatory Poverty Assessments in India (prepared by Sujatha Viswanathan and Ravi Srivastava), Asian Development Bank, Manila, Philippines http://www.adb.org/Documents/Books/Learning-From-the-Poor/Learning-From-the-Poor.pdf

Poverty Characteristics in South Asian Context

Major Characteristics of poverty	**Characteristics of people living in poverty**
Remoteness; Absence of accessible road; No school or other educational facility; Absence of marketplace; No health center; Lack of potable drinking water; Absence of irrigation system; No development project; and Lack of arable land[13].	The poorest households according to the PPA findings have the following characteristics: Little or no land (2-3 acres); Perhaps one draft animal but no farming implements; Housing made of thatch in very poor condition; Few household utensils; Live on hand-to-mouth basis (food shortages for up to eight months); Much reliance on natural resources to meet subsistence needs; Accumulated debts and inability to repay or borrow additional amounts; No kinship support; and Large young families with 5-12 children[14].
Poor are located	
Poor live in rural areas or in pockets of urban areas—in hamlets or slum clusters, in inhospitable terrain, outliers of the development circle[15].	
The Major Concerns of the Poor	**The Challenge of Poverty**
Lack of food security Life crises and the lack of assets Access to and ownership of land Nonexistent or limited access to educational opportunities Flooding and drought Lack of micro-finance Poor physical infrastructure Decreasing access to community natural resources Social exclusion Disenfranchisement of land use rights and access to natural resources[16]	Poverty is a combination of income, non-income, and expenditure related factors encompassing income and its regularity; non-income factors bearing on opportunities and capability; and complex factors impacting on expenditure. The static pool of poor consists of those who carry the highest burden of deprivation and exclusion from the processes of development. The dynamic pool consists of the "transient poor" who fall into poverty seasonally or due to passing life cycle situations, natural, social, and sporadic factors[17].
Aspects of poverty CBD concern	
Lack of access to education; health care; adequate nutrition and to food security Lack of personal security; shelter and clothing The absence of political autonomy; empowerment The lack of freedom of choice Social inequality Vulnerable to adverse events outside their control[18]	

Source: ADB 2001; 2007; CBD 2011

13 (ADB 2001:6-7)
14 (ADB 2001:16)
15 (ADB 2007:5- India case)
16 (ADB 2001)
17 (ADB 2007:1)
18 CBD (2011) Biodiversity and poverty, Goods and Services for the World's Poorest people, Secretariat of the Convention on Biological Diversity, Montreal, Canada http://www.cbd.int/doc/publications/development/poverty-alleviation-booklet-en.pdf

3 Proposed definitions of ecosystem services

The Secretariat proposed to use the Common International Classification of Ecosystem Goods and Services (CICES) as a definition of ecosystem services:

Ecosystems goods and services are defined by CICES as: "the contributions that ecosystems make to human well-being, and arise from the interaction of biotic and abiotic processes. Following the Millennium Ecosystem Assessment, the term 'services' is generally taken to include both goods and services"[19].

This definition could also be complimented by Smith (2010):

An ecosystem is a dynamic complex of plant, animal, and microorganism communities and their non-living environment interacting as a functional unit. Biomes are the largest unit of ecological classification that is convenient to classify (below the entire globe). Terrestrial biomes are typically based on dominant vegetation structure (e.g. forests, grasslands). Ecosystems within a biome function in a broadly similar way, although they may have very different species compositions. For example, all forests share certain properties regarding nutrient cycling, disturbance, and biomass that are different from the properties of grasslands. Marine biomes are typically based on biogeochemical properties. The WWF biome classification is commonly used, for example in the definitive Millennium Ecosystem Assessment[20].

Ecosystem services are the benefits people obtain from ecosystems[21]. The Millennium Ecosystem Assessment uses four different classes of ecosystem services. These are provisioning services such as food, water, timber, and fibre; regulating services that affect climate, foods, disease, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling. The concept ''ecosystem goods and services'' (EGS) is synonymous with ecosystem services.

Mr. Bhandari also proposed various definitions of ecosystem services

"An ecosystem is a community of interacting organisms and the physical environment they live in. We know ecosystems as the forests, grasslands, wetlands, deserts, coral reefs, rivers, estuaries, and other living environments that surround us. They also include the farms, pastures, and rangelands—collectively known as agro-ecosystems that feed us. They are the earth's living engines of production, providing the goods and services—air, food, fiber, water, aesthetics, and spiritual values—that make life possible for rich and poor alike"[22].

19 Centre for Environmental Management, 2010. Proposal for a Common International Classification of Ecosystem Goods and Services (CICES) for Integrated Environmental and Economic Accounting. In Fifth Meeting of the UN committee of Experts on Environmental-Economic Accounting. New York: Department of Economic and Social Affairs, Statistics Division, United Nations, p. 30.

20 MA, 2005a. Ecosystems and Human Well-being: Current State and Trends: findings of the Condition and Trents Working group R. Hassan, R. Scholes, & N. Ash, eds., Millenium Ecosystem assessment, Washington-Covelo-London, UK: Island Press.

21 MA, 2005b. Ecosystems and Human Well-being; Our human plant, Summary for Decision Makers., Millenium Ecosystem assessment, Washington-Covelo-London, UK: Island Press.

22 World Resources Institute-WRI (2005) World Resources 2005: The Wealth of the Poor—Managing Ecosystems to Fight Poverty, WRI- in collaboration with United Nations Development Program, United Nations Environment Program, and World Bank, Washington, DC http://pdf.wri.org/wrr05_lores.pdf www.unep.org/geo/geo4/

"Ecosystems are – or can be – the wealth of the poor. For many of the 1.1 million people living in severe poverty, nature is a daily lifeline – an asset for those with few material means. This is especially true for the rural poor, who comprise three-quarters of all poor households worldwide. Harvests from forests, fisheries and farm fields are a primary source of rural income, and a fallback when other sources of income falter. But programs to reduce poverty often fail to account for the important link between environment and the livelihoods of the poor"[23].

Ecosystem Services are "Particularly important services on which poor people are dependent include the provision of food (both the components of biodiversity that are consumed and the wide range of biodiversity that is crucial for food production); medicines and health (through both the supply of natural medicines, and through the regulation of infectious and emerging diseases); timber, fibres and fuels from forests and other sources; the regulation of fresh water quality and quantity; protection from (and regulation of) natural hazards; and the cultural benefits of biodiversity. Supporting services on which these various benefits depend are also crucial, and in particular soil formation, pollination, nutrient cycling and the control of agricultural pests and diseases"[24].

23 (WRI 2005:3)
24 UNEP-WCMC (2007) Biodiversity and poverty reduction: The importance of biodiversity for ecosystem services. United Nations Environmental Program World Conservation Monitoring Centre (UNEPWCMC), Cambridge as in Shackleton *et al.* 2008

4 Proposed definitions of sustainable development

The Secretariat proposed to use the following definition of sustainable development :

Over twenty years after the Brundtland Report and with the evolution of thinking on the fight against poverty, the contemporary vision of **sustainable development** can be taken as *"what preserves and develops the freedom and capability of today's people to act and meet their needs without compromising those of future generations"* [25]. This vision seems to be in line and consistent with the evolution of thinking on biodiversity, now perceived not simply as a heritage to be preserved to maintain a climax or a balance but rather as an adaptive natural potential to be managed to provide long term access to ecosystem services for human well-being. In that way, biodiversity must be recognized as the foundation for achieving sustainable development and the economic prosperity of States.

25 Adapted from Brundtland, G.H., 1987. Our Common Future. , p.11. and Sen (2010)

5 Some definitions of mainstreaming

The Secretariat proposed to use the following definition of mainstreaming

In this report, **mainstreaming** is referred to as a stepwise process integrating of biodiversity and ecosystem services into national, sub-national and international poverty eradication and development policies, documents, budgets, strategies regulations, plans, and actions. It is an iterative long-term effort that involves many actors and stakeholders.

This definition could perhaps be complemented by the PEI's definition of poverty-environment mainstreaming:

The iterative process of integrating poverty-environment linkages into policymaking, budgeting and implementation processes at national, sector and subnational levels. It is a multi-year, multi-stakeholder effort that entails working with government actors (head of state's office, environment, finance and planning bodies, sector and sub-national bodies, political parties and parliament, national statistics office and judicial system), non-governmental actors (civil society, academia, business and industry, general public and communities, and the media) and development actors[26].

26 UNPEI, 2009. *Mainstreaming poverty-environment linkages into development planning: a handbook for practitioners*, Earthprint.

6 Complimentary definitions proposed by Mr. ten Brink

6.1 Biotic homogenization

- The replacement of local organisms by exotic species that can co-exist with humans.
- As a result of human interventions the abundance of many native species decrease ('losers') while the abundance of a few other –often human favored species ('winners') – increases. Consequently ecosystems become more and more alike (Ten Brink, 2000).
- Process by which the differences between biotic communities in different areas are on average reduced.

6.2 Brittle and non-brittle ecosystems

Brittleness is the pattern of distribution of moisture in all forms through the year. Non-brittle ecosystems have regular distribution of moisture (whether rain, snow, or humidity) throughout the seasons." At the other extreme of the continuum, "brittle" environments have very different characteristics with irregular uneven distribution of moisture during the year. A scale of 1 (extremely non-brittle) to 10 (extremely

brittle) may be used to describe the degree of brittleness. (Allan Savory; www.managingwholes.com). Brittleness was taken as a proxy for the sensitivity of the ecosystem to degradation and the lack of capacity to resilience from perturbation.

6.3 DPSIR-causal effect chain

- Driving force (indirect drivers of change, such as population growth and consumption)
- Pressure (direct drivers of change, such as acidification, land conversion, and hunting)
- State (condition of studied subject, such as biodiversity, and water, soil and air quality)
- Impact (how the change in the state affect people in socioeconomic or health terms)
- Response (the measures taken by man to change D-P-S or I)
- DPSIR are sequential steps in the effect-chain. They all have a past, present and future value.

6.4 Farming system

A farming system is defined as a population of individual farm systems that have broadly similar resource bases, enterprise patterns, household livelihoods and constraints, and

for which similar development strategies and interventions would be appropriate. Depending on the scale of the analysis, a farming system can encompass a few dozen or many millions of households (Dixon et al., 2001).

6.5 Human Development Index (HDI)

The human Development is a composite indicator of Human Development (HDR, 2002) on the basis of three basic dimensions:

- a long and healthy life (life expectancy)
- knowledge (adult literacy and primary, secondary and tertiary gross enrollment ratio
- a decent standard of living: GDP per capital at purchasing power parity in US dollars.

6.6 Human Poverty Index (HPI)

The human poverty index is a composite indicator for the state of deprivation on human wellbeing for three basic domains:

- possibility at birth of not surviving to age 40;
- adult illiteracy rate
- children under weight for age and population without sustainable access to improved water source.

6.7 Human well-being

Human well-being captures people's living condition, quality of life or human development. According to the MEA (2003) human well-being is determined by five dimensions: basic material for a good life, freedom and choice, health, good social relations and security.

6.8 Hunger

A condition in which people lack the basic food intake to provide them with the energy and nutrients for fully productive, active life and is an outcome of food insecurity (FAO, 2004).

6.9 Infant Mortality Rate

Deaths of children under one or five year old per 1000 live births.

6.10 Livelihood

Activities, assets (material and social resources), and access that jointly determine the living gained by an individual or household compose a livelihood. While livelihoods are generally associated with monetary or material rewards, poor people also use the concept to refer to less tangible benefits like a sense of greater social acceptance or of being more empowered. A focus on livelihoods, as Farrington et al. (1999) explain, puts

emphasis on: people and their activities, the holistic nature of people's activities and the links between the micro and macro (www.idrc.ca/en/).

6.11 Man-made ecosystems

Heavily modified areas intensively used and managed by humans such as cropland, permanent agriculture, infrastructure, artificial waters such as ditches and canals and industrial and mining area, including (semi)natural elements within these areas.

6.12 Poverty

Poverty is an undesired state of human well-being, measured as a score below a certain level of human well-being (Sen, 1999).

6.13 Poverty headcount

Poverty headcount is the number of people with an income below the national or international poverty line (absolute number).

6.14 Poverty rate

Poverty rate is the percentage of the population with an income below the poverty line (a relative number).

6.15 Poverty reduction

Poverty reduction is any process which seeks to reduce the level of poverty in a community, or amongst a group of people or countries.

6.16 Resource user

Household level economic unit that depends on agricultural, livestock, fisheries, timber or non-timber-forest production for their livelihood or family income.

6.17 Species abundance

The number of individuals of a species, which may be measured in various ways such as biomass, density, total numbers, distribution, breeding pairs, etc.

6.18 Species diversity

Diversity at the species level, often combining aspects of

species richness and their relative abundance.

6.19 Stunting

Stunting is chronic undernutrition measured by low length for age among children under five years old.

6.20 Sustainability

A characteristic or state whereby the needs of the present and local population can be met without compromising the ability of future generations or populations in other locations to meet their needs.

6.21 Sustainable use (of an ecosystem)

Human use of an ecosystem so that it may yield a continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations.

6.22 Use system

Use systems are exploitation of natural resources such as hunting, gathering and fishery or the conversion of natural habitat into cropping, grazing and forestry production systems. (see also farming system).

6.23 Vulnerability

Vulnerability is the exposure to contingencies and stress, and the difficulty in coping with them. Three major dimensions of vulnerability are involved:

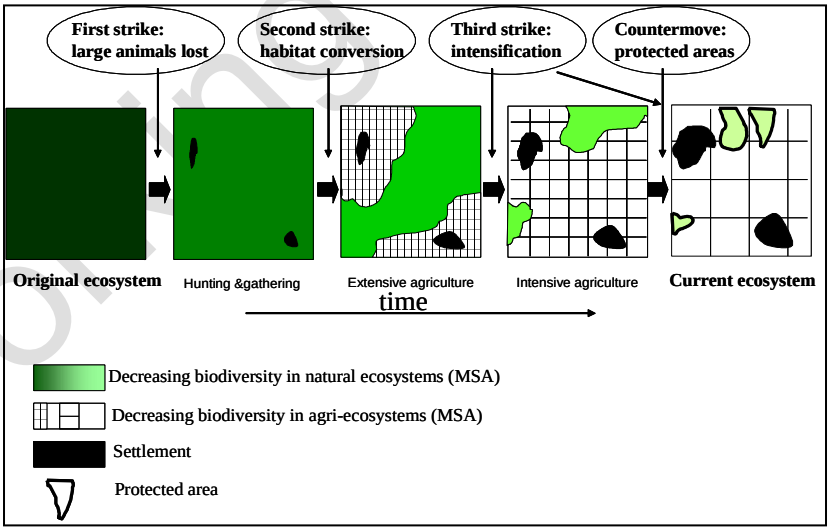
- exposure to stresses, perturbations, and shocks;
- the sensitivity of people, places, ecosystems, and species to the stress or perturbation, including their capacity to anticipate and cope with the stress;

- and the resilience of ecosystems and species in order to recover from shocks and the adaptive capacity of people in terms of their capacity to absorb shocks.

6.24 The process of biodiversity loss (Derived from the SEBI working group on Interlinkages between biodiversity indicators)

(…) What is the core process of biodiversity loss? Giving the complexity of biodiversity there is no easy answer, but a few generic changes can be observed. At ecosystem level, biodiversity loss is characterised by habitats conversion, reduction or degradation. At species level, many original species decrease in abundance while at the same time a few other – often opportunistic – species increase in abundance, as a result of human interventions. The original species are gradually replaced by those human-favoured ones. Some may even become plagues. Extinction is just a last step in a long degradation process of local extirpations. Remarkably, local or national species richness often increases initially because of these new species. This is the so-called 'intermediate disturbance diversity peak' (Lockwood and McKinney, 2001). Biodiversity loss takes place in crop varieties and livestock breeds in a similar way as in wild species. The initial large diversity of crop varieties and breeds adapted to local environments from traditional agricultural landscapes is replaced by an ever smaller group of highly productive ones, suitable for standardised agricultural environments (like Frisian Holstein cattle and Texel sheep).

Because of these changes, ecosystems lose their regional specifics and become more and more alike: *homogenisation* (Lockwood and McKinney, 2001; MA, 2005). In essence, biological homogenisation is very similar to economic globalisation[27]. Figure 1 shows a schematic view of human socio-economic development, from a long-term perspective. Humans change their environment starting as hunter-gatherers followed by extensive and intensive cultivation, and finally act as protectors.



27 A similar process is the change in the number and types of shops. The number of shops in streets is not changing. It is merely the type of shops. Specific, local shops are gradually replaced by common global chains such as the Body Shop, McDonalds and IKEA. As a result, the 'shop-richness' in towns is not changing but towns are becoming more and more alike, having all the same shops. The same holds for biodiversity. We get the same set of species everywhere.

Figure 1: Schematic picture of the different stages of human interventions in natural ecosystems and the corresponding loss of biodiversity due to homogenisation. From left to right human appropriation of solar energy is increasing. Humans 'parcel' multi-functional natural systems into highly productive mono-functional production systems of wheat, rice, cattle, houses, water basins, roads and nature. Remaining nature is still suffering increasing pressure from pollution, climate change and invasive species.

Daniel Pauly strikingly illustrated this process with the 'fishing down the food web' illustration (Figure 2). Irrespective of whether we deal with agricultural, forest, marine, or aquacultural ecosystems, the underlying homogenisation process is similar.

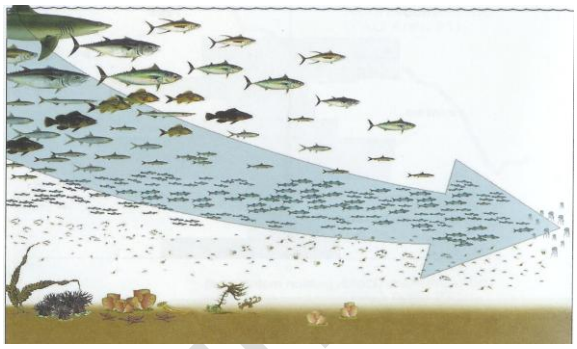


Figure 2: Fishing down the food web according to Pauly (Pauly et. al, 1998). Large, long-lived and slow reproductive species are replaced by small, short-lived, highly reproductive species due to fishing, pollution, eutrophication and other pressures. A similar process can be seen in terrestrial ecosystems: "logging, burning, hunting, polluting and ploughing down the food web".

6.25 Goods and services

Goods are the tangible products of an ecosystem, often marketable (timber, water, fruits, fish, ..), while services are non-tangible products (fertility, pollination, water retention, climate regulation, …), usually not marketable.

6.26 Ecosystem restoration

The re-establishing the presumed structure, productivity and species diversity that originally present at a site that has been degraded, damaged or destroyed. In time, the ecological processes and functions of the restored habitat will closely match those of the original habitat (SER, 2004; FAO, 2005)

6.27 Ecosystem reclamation

aims to recover productivity (but little of original biodiversity) at a degraded site. In time, the protective function and many of the original ecological services may be re-establised. Reclamation is often done with exotic species but may also involve native species (WWF/IUCN 2000).

6.28 Ecosystem degradation

Damage to ecosystems as a consequence of human interventions -anywhere in past or present- which has led to a sustained loss (partially or totally) of its capacity to deliver certain functions as compared to the intact (natural, potential, pristine) ecosystem. Key functions are:

- Primary production
- Soil organic Carbon accumulation, C-storage
- Water retention; attenuation of stream flow fluctuations (+floods & droughts)
- Determination of macro and micro climate
- Biodiversity