

Depend on Nature

Ecosystem Services supporting Human Livelihoods



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Executive Summary

Human wellbeing depends on the capacity of the earth's natural systems to provide ecosystem goods and services. We rely on ecosystem services¹ to provide the basics of life - food, water, shelter, clothing and clean air – and to regulate our climate, to pollinate our crops and to inspire our societies and cultures. Yet, at the same time, the biological diversity that delivers these services is being lost.

The recently released Millennium Ecosystem Assessment chillingly concludes that, unless we take action to mitigate the decline in ecosystem services, the costs to society will be substantial. The necessary actions are feasible, provided they are backed up by political will and targeted financing. IUCN contends that investments in biodiversity conservation will help maintain the flow of ecosystem services and, in turn, will yield both immediate and long-term dividends to human wellbeing.

While environmental conservation alone will not achieve the internationally-agreed development goals, including those contained in the United Nations Millennium Declaration, it can and does make a major contribution. Over the past decades, we have learnt a great deal about the linkages between biodiversity, ecosystem services and human wellbeing. We have sufficient examples to show that the conservation and sustainable use of biodiversity can contribute to poverty reduction, human health, equity and security. Conversely, we have clear evidence that environmental mismanagement undermines livelihoods, human security and sustainable development.

To deliver internationally-agreed development goals, we need to address three key challenges: improving governance of natural resources, increasing investment in sustainable management of those resources, and employing relevant technologies, specifically landscape-scale management. Approaches to these challenges will need to include both strengthened partnerships and a new culture of knowledge mobilisation.

For each of these challenges, IUCN proposes actions for implementation. In addition, IUCN proposes some 'First Steps' that should be initiated now if we are to secure our future (see Table 1). Paramount among those first steps is making use of the many tools and efforts that are already in place. Over the past decades, significant effort has already been put toward planning and prioritisation that link human development, ecosystem services and the sustainable use and conservation of biodiversity. Rapid progress can be made by reviewing existing commitments in national-level strategy documents. And focusing development assistance and private sector support on these opportunities.

We wish to emphasize that IUCN's First Steps are not discrete victories, but are catalysts for medium and longer-term action. First Steps need to be followed by broader actions to lead to a sustainable future.

¹ We will use the term ecosystem services to mean ecosystem goods and services to improve readability.

[Table 1] – Ten actions and their first steps for achieving development goals through environmental management

Improving governance for delivery of ecosystem services

1. Integrate ecosystem management for human wellbeing into development planning and implementation
 - Review existing planning and management documents, such as Poverty Reduction Strategy Papers, to identify opportunities where improved ecosystem management can contribute to achieving poverty reduction.
 - Ensure that new or revised national poverty reduction and growth promotion planning documents fully integrate existing national ecosystem management plans (e.g. National Strategies for Sustainable Development, plans and programmes of MEAs, and sectoral strategies).
2. Decentralise natural resource management
 - Initiate incentive schemes that liberalise resources used by the poor and reward good environmental stewardship.
 - Remove constraints (e.g. inaccessible credit markets, inequitable tenure arrangements) that limit poor people's sustainable use of natural resources.
3. Mainstream the multilateral environmental agreements in development planning and implementation
 - Support harmonisation among the MEAs.
 - Ensure a full and effective fourth replenishment of the Global Environment Facility that reflects the increased scope of work requested of the GEF.
 - Promote MEAs participation in relevant discussions of the Bretton Woods Institutions.
4. Promote equity, especially gender equity, in natural resource management
 - Improve women's access to natural resources and participation in environmental decision-making.
 - Review existing conservation and development policies to ensure effective participation of indigenous and local communities.

Investing in ecosystem services for people

5. Mainstream biodiversity concerns into business planning and operations
 - Use tools such as 'triple bottom line' accounting and sustainability audits.
 - Fully implement the recommendations of the World Commission on Dams and the Extractive Industries Review.
 - Promote incorporation in the insurance industry of environmental concerns in risk assessments and liability for environmental damage/degradation in relevant policies.
6. Adapt to deal with the expected impacts of climate change
 - Fully fund and implement National Adaptation Plans of Action.
 - Restore ecosystems at vulnerable sites to buffer livelihood options and conserve biodiversity from projected impacts of climate change.
 - Promote the use of renewable energy as an important tool for enhancing livelihoods.
7. Explore and support payments for ecosystem services
 - Promote legislative frameworks and voluntary initiatives that enable markets for ecosystem services, including markets for carbon emission reduction and sequestration, watershed management, and biodiversity conservation.
 - Promote valuation of ecosystem services, including removal of subsidies and perverse incentives.

Managing at landscape scales

8. Ensure at least minimum environmental flows in all water management schemes
 - Apply environmental flow assessments as part of river basin planning to ensure sustainable livelihoods downstream.
 - Implement adaptive management plans, including restrictive management, to deliver water resources.
9. Incorporate representative networks of protected areas into landscape management
 - Complete a gap analysis of ecosystem coverage by protected areas to identify key opportunities for new protected areas that can enhance local livelihoods.
 - Enhance management effectiveness of protected areas to improve delivery of ecosystem services provided by those areas.
10. Restore landscapes and seascapes to benefit people and nature
 - Enhance ecosystem productivity of river basins, coastal zones and forests through landscape-scale restoration.
 - Initiate programmes to control and/or eradicate invasive alien species that threaten livelihoods and ecosystem productivity.

Introduction: Ecosystem Services and Human Wellbeing



Ecosystem services are the benefits people receive from ecosystems. These services are the result of complex relationships and processes of the components of biodiversity – genes, species and ecosystems – working together. The benefits come in many forms from the tangible provision of the necessities of life – food, water, medicine, clean air – to the aesthetic inspiration for our culture and society. These services are the foundation of our daily lives and, for most of us, they are available without us being conscious of the many and complex processes involved. The Millennium Ecosystem Assessment adopted a framework with which to describe these services and to analyse the current state of delivery of those services, as well as the drivers that impacted upon that delivery². This framework provides a clear understanding of the many ways that nature supports our lives (see Figure 1).

Loss of ecosystem services has impacts on us

It is difficult to measure the long-term impact of biodiversity loss and impaired delivery of ecosystem services. While we know that the total loss of such services would mean the end of life on Earth, at a more realistic level, there is also concern that any loss of ecosystem services will have an impact on our wellbeing. Unfortunately, we do not yet adequately value those services in economic terms and we do not understand the trade-offs that we are making when allowing unbridled economic gain without incorporating social and environmental concerns.

Of all the global level analyses, The Wellbeing of Nations (Prescott-Allen, 2001) provided one of the most comprehensive pictures of both human and ecosystem wellbeing. Its Human Wellbeing Index (HWI) measures progress toward a goal of human wellbeing while the Ecosystem Wellbeing Index (EWI) measures progress to the goal of ecosystem wellbeing. The Index is measured in a scale – bad, poor, fair, medium, and good – that describes the overall performance of the country with respect to key indicators. Two-thirds of the world's population lives in countries with a poor or bad HWI score (undesirable or unacceptable performance).

Only one-sixth live in countries with a good or fair HWI (desirable or acceptable performance).

In Africa, this disparity is most pronounced – only four countries have even a medium HWI, and the rest have poor or bad HWI scores. No African country has a good EWI score. Countries with a poor or bad EWI cover almost half of the planet's land and inland water surface. Those with a medium EWI cover a further 43%. Only 8.6% of land area is covered by countries with a fair EWI. Combining and comparing human and ecosystem wellbeing leads to a clear conclusion: no country has achieved, or is close to, sustainability.

Five years ago the Millennium Declaration recorded the commitment of the members of the United Nations to eradicate extreme poverty and hunger and to build a secure and peaceful world conducive to human development. The eight Millennium Development Goals (MDGs) agreed by the United Nations General Assembly in 2000 aim to “significantly improve the human condition by 2015.” Clear targets have been set, and indicators have been developed to assess progress (Table 2).

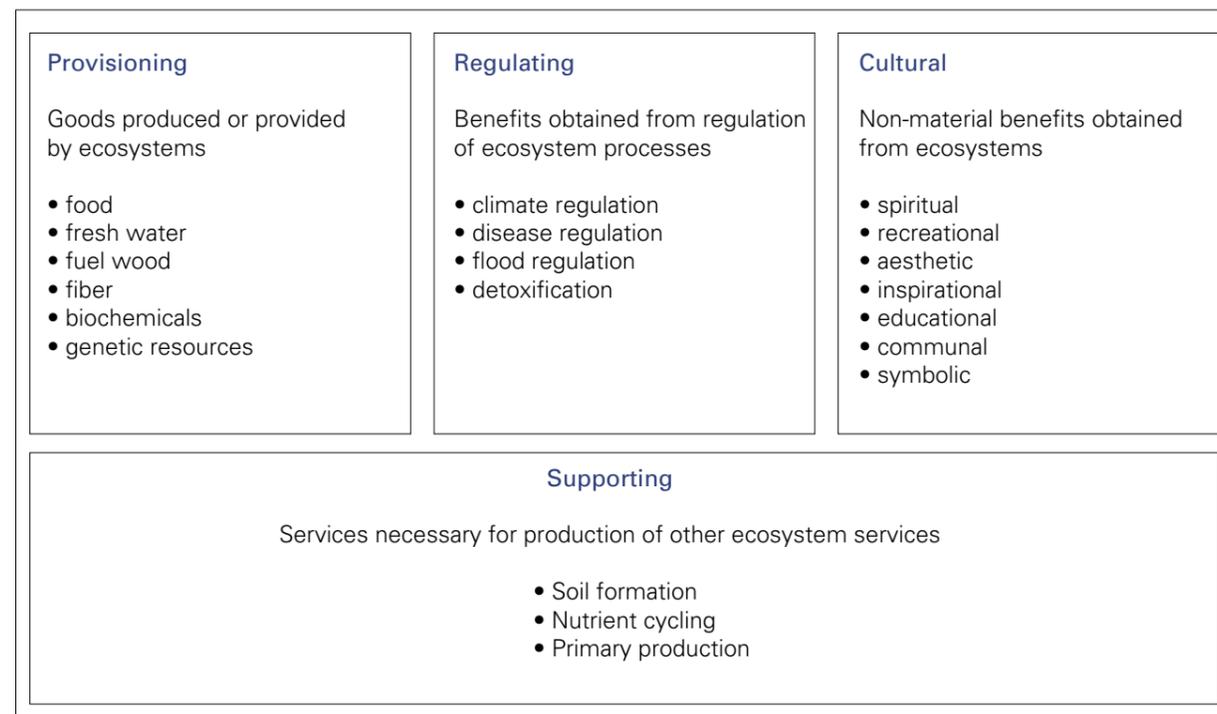
The MDGs reflect the relationship between the environment and sustainable development: the targets and indicators are based on delivery of ecosystem services to the poor. While MDG 7 is the only Goal explicitly targeting the environment, achieving each of the goals will require the support of a functioning ecosystem. In turn, achieving the MDG 1-6 will support delivery of MDG 7.

Listing the MDGs and accompanying targets may imply that these are a sort of checklist of items that can be accomplished one by one. However, it is far better to consider them as an integrated set. Progress in achieving one MDG or target depends on also achieving others. Since all life on earth, and therefore human wellbeing, depends on ecosystem services, MDG 7 on Environmental Sustainability provides a foundation upon which the others can build (Table 3).

As the links between the environment and human wellbeing become more clearly articulated, so too are the threats that impact on both. In particular, climate change, invasive alien species and unsustainable resource use are emerging as key issues that must be addressed.

² <http://www.millenniumassessment.org/en/Products.EHVB.aspx>

[Figure 1] - Ecosystem services supporting human wellbeing



Source: Millennium Ecosystem Assessment, 2005

[Table 2] - Millennium Development Goals (MDGs)

Goal	Targets	Progress towards MDG
1/ Eradicate extreme poverty and hunger	<p>Target 1: Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day</p> <p>Target 2: Halve, between 1990 and 2015, the proportion of people who suffer from hunger</p>	<p>Global prospects for reducing poverty are good, thanks to strong economic growth in China, India, and other countries in Asia. But malnutrition persists even in rapidly growing economies, and millions of people remain hungry. The situation in Africa is improving slowly at best.</p>
2/ Achieve universal primary education	<p>Target 3: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling</p>	<p>Many countries have achieved the goal of universal primary education and many more are likely to do so by 2015 but progress has been slow in parts of Africa and Asia.</p>
3/ Promote gender equality and empower women	<p>Target 4: Eliminate gender disparity in primary and secondary education preferably by 2005 and to all levels of education no later than 2015</p>	<p>Although some progress has been reported, full equality of enrolments in primary and secondary school has not been universally achieved.</p>
4/ Reduce child mortality	<p>Target 5: Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate</p>	<p>Progress toward the health goals has been slow with only 33 countries on track to reach the child mortality goal.</p>
5/ Improve maternal health	<p>Target 6: Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio</p>	
6/ Combat HIV/AIDS, malaria and other diseases	<p>Target 7: Have halted by 2015, and begun to reverse, the spread of HIV/AIDS</p> <p>Target 8: Have halted by 2015, and begun to reverse, the incidence of malaria and other major diseases</p>	
7/ Ensure environmental sustainability	<p>Target 9: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources</p> <p>Target 10: Halve, by 2015, the proportion of people without sustainable access to safe drinking water</p> <p>Target 11: By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers</p>	<p>Most regions are on track to meet the drinking water target, but only Latin America and East Asia are on track to reach the sanitation target. Progress towards the other targets is poor.</p>

Source: World Bank, 2005

Continued on next page

[Table 2] - Millennium Development Goals (MDGs) *continued*

Goal	Targets	Progress towards MDG
8/ Develop a Global Partnership for Development*	<p>Target 12: Develop further an open, rule-based, predictable, non-discriminatory trading and financial system. Includes a commitment to good governance, development, and poverty reduction – both nationally and internationally</p> <p>Target 13: Address the Special Needs of the Least Developed Countries Includes: tariff and quota free access for LDC exports; enhanced programme of debt relief for HIPC and cancellation of official bilateral debt; and more generous ODA for countries committed to poverty reduction</p> <p>Target 14: Address the Special Needs of landlocked countries and small island developing states (through Barbados Programme and 22nd General Assembly provisions)</p> <p>Target 15: Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term</p> <p>Target 16: In co-operation with developing countries, develop and implement strategies for decent and productive work for youth</p> <p>Target 17: In co-operation with pharmaceutical companies, provide access to affordable, essential drugs in developing countries</p> <p>Target 18: In co-operation with the private sector, make available the benefits of new technologies, especially informations and communications</p>	Building a global partnership for development between developed and developing countries remains a work in progress.

[Table 3] - Key Links between Millennium Development Goals and the environment

Millennium Development Goals	Examples of links to the environment
1/ Eradicate extreme poverty and hunger	<ul style="list-style-type: none"> Livelihood strategies and food security of the poor often depend directly on functioning ecosystems and the diversity of goods and ecological services they provide. Insecure rights of the poor to environmental resources, as well as inadequate access to environmental information, markets, and decision-making, limit their capacity to protect the environment and improve their livelihoods and wellbeing.
2/ Achieve universal primary education	<ul style="list-style-type: none"> Time that children, especially girls, spend collecting water and fuel wood can reduce study time. Additional income generated from sustainable management of natural resources is available to be spent on education.
3/ Promote gender equality and empower women	<ul style="list-style-type: none"> Time that women spend collecting water and fuelwood reduces their opportunity for income-generating activities. Poor rural women often depend heavily on natural resources, but inequity and lack of secure rights limit their access to decision-making and resources.
4/ Reduce child mortality	<ul style="list-style-type: none"> Improved management of local watersheds can reduce child mortality related to water-borne disease.
5/ Improve maternal health	<ul style="list-style-type: none"> Indoor air pollution and carrying heavy loads during late stages of pregnancy put women's health at risk before childbirth.
6/ Combat HIV/AIDS, malaria and other diseases	<ul style="list-style-type: none"> Environmental risk factors account for up to one-fifth of the total burden of disease in developing countries. Preventive environmental health measures are as important, and at times more cost-effective, than health treatment.
7/ Develop a global partnership for development	<ul style="list-style-type: none"> The complex interaction between human wellbeing, ecosystem services and biodiversity requires an integrated approach including partnerships between civil society, the private sector and government.

Sources: taken from UN Millennium Project 2005, DFID et al. 2002; UNDP 2002;

* The selection of indicators for Goals 7 and 8 is subject to further refinement

Human Wellbeing in 2005



Population, Consumption and Equity

The human population quadrupled during the 20th century, increasing from about 1.5 billion in 1900 to about 6 billion in 2000. During that time, consumption of natural resources increased by a factor of sixteen. The median projection of the United Nations expects the world's population to increase to more than 9 billion people, with the population of the less developed countries projected to increase from 4.9 billion in 2000 to 7.8 billion by 2025 (UN, 2005). In addition, per capita consumption is projected to increase, putting even greater pressure on natural resources.

Population and population growth cannot be considered in isolation from consumption. If global GNP can be taken as an indicator of consumption, then the situation will become more intense. Aggregate world GNP is about 35 trillion today, and will increase to 135 trillion by 2050 (World Bank, 2004b). Today's industrial economies consume unsustainable quantities of energy and raw materials, and produce high volumes of wastes and polluting emissions. As UNEP (2002) points out, the resulting pollution and disruption of ecosystems often occurs in countries far removed from the site of consumption. Consumption patterns, development choices, wealth distribution, government policies and technology can mitigate or exacerbate the environmental effects of demographic change.

Many countries show a strong link between population, gender equity, the roles and rights of women and the state of the environment. Changes in gender balance as a result of selective migration, war, population control programmes, or disease may put additional pressure on women to meet household responsibilities.

Food Security

FAO estimates that 852 million people are undernourished and the vast majority of those (815 million) live in the developing world, primarily in rural areas. The hunger problem is most serious in sub-Saharan Africa, where more than 40% of the population is undernourished. In most cases the problem is not one of malnutrition but of chronic hunger – a daily calorie or nutrient deficit that decreases one's ability to lead a productive active life. Nine million of the hungry live in the world's richest countries, where, paradoxically, a high level of obesity is also a growing health problem.

Projections indicate that the global numbers of undernourished people should decrease to less than 580 million by 2015, but some regions (e.g. Asia) are expected to make good progress, while others (e.g. sub-Saharan Africa) seem destined to lag behind (FAO, 2004). The growth in numbers of undernourished people in Africa has slowed during the past decade, but meeting the MDG 1 target of halving the proportion of people who suffer from hunger by 2015 continues to be a challenge.

Meeting the nutritional needs of the world's growing population will require concentrated efforts to deliver ecosystem services. The products of agriculture provide more than 90% of daily caloric intake globally, and fish provide more than 20% of dietary protein for 2.6 billion people (FAO, 2004b). However, capacity to improve productivity is limited. In 2000, the International Food Policy Research Institute reported that soil degradation had already had significant impacts on the productivity of about 16% of the globe's agricultural land. Combining the updated maps with existing expert assessments of soil degradation suggests that almost 75% of crop land in Central America, 20% in Africa (mostly pasture), and 11% in Asia is seriously degraded (IFPRI, 2000).

The problem is not restricted to agriculture and soil degradation. The FAO reports that 47 to 50% of major fish stocks are fully exploited and are, therefore, producing catches that have either reached or are very close to their maximum limits, with no room for further expansion. Another 15-18% is already overexploited and has no potential for further increase (FAO, 2000).

Health

The World Health Report (WHO, 2002) reported that the ten leading risk factors for disease globally are: being underweight; unsafe sex; high blood pressure; tobacco consumption; alcohol consumption; unsafe water, sanitation and hygiene; iron deficiency; indoor smoke from solid fuels; high cholesterol; and obesity. Together, these account for more than one-third of all deaths worldwide. Several of these risk factors are related to the environment, especially the risks related to malnutrition, unsafe water and indoor smoke from solid fuels. More recent editions of the Report discuss the impact of HIV/AIDS: in 2003, 3 million people died and 5 million others became infected (WHO, 2004). In 2005, the World Health Report focused on maternal and child health and predicted that in 2005 almost 11 million children under five years of age will die from causes that are largely preventable (WHO, 2005).

Environmental hazards are responsible for an estimated 25% of the total burden of disease worldwide, and nearly 35% in sub-Saharan Africa. Particular environmental issues with health impacts include vector-borne disease such as malaria, climate change, toxic substances and natural disasters.

However, the environment is not only a cause of disease, but also a source of treatment. Some 80% of people in developing countries rely on traditional medicines, mostly derived from plants, and more than half of the most frequently prescribed drugs in developed countries derive from natural sources. WHO has identified 20,000 species of medicinal plants for screening, and many more species exist whose medicinal values are only just being discovered or may prove important in the future. In the USA alone, botanical medicine sales were estimated at USD 3.87 billion in 1998 (Brevoort, 1998). The global trade in medicinal plants has already grown to well over USD 800 million per year, and over-the-counter sales of plant-derived drugs are worth more than USD 40 billion.

Access to Water and Sanitation

Land and water resources are owned by a wide variety of people and institutions. Most of the world's farmers are small landowners, although in some countries large farms are occasionally farmed by tenants. Water resources ownership is sometimes linked to land ownership, but most water resources are state owned (IUCN, 2000).

Between 1990 and 2002, access to improved drinking water supplies rose from 77% to 83% of the world's populations with significant progress being made in Asia, the Pacific, and sub-Saharan Africa. However, more than one billion people still live without improved drinking water and nearly two thirds live in Asia. Similarly, global sanitation coverage improved between 1990 and 2002 from 48% to 58%, but in Africa, Asia and the Pacific less than half the population benefit from this service (WHO/UNICEF, 2004).

Poverty

Recent estimates put the number of people living in extreme poverty at 1.1 billion with the majority living in South Asia and sub-Saharan Africa (UNDP, 2004). However, such statistics are often difficult to interpret as poverty is often defined as people falling below a specified income level (e.g. USD 1 per day), whereas poverty has multiple dimensions: lack of assets, powerlessness and vulnerability (The World Bank, 2001).

According to IFAD (2002), 75% of the poor are rural dwellers. These people depend heavily on natural resources for their livelihoods and they are affected by development or conservation interventions that alter their access to ecosystem services and biodiversity. Indeed, many development activities have made many poor people worse off.

The World Development Report's framework for action to effectively reduce poverty suggests the need for increasing the resilience of the poor by: providing opportunities (for work and to build up their assets); empowerment (effectively influencing the decision-making processes of institutions that affect their lives and strengthening participation in political processes at all levels); and security (reducing their vulnerability to risks such as natural disasters, ill health and economic shocks, and helping them to cope) (World Bank, 2001).

Conservation can contribute to poverty reduction, particularly through restoring ecosystems and by improving the access of the poor to ecosystem services, thus contributing to secure livelihoods for the people who depend on them (Fisher et al., 2005).

Ecosystem Services in 2005



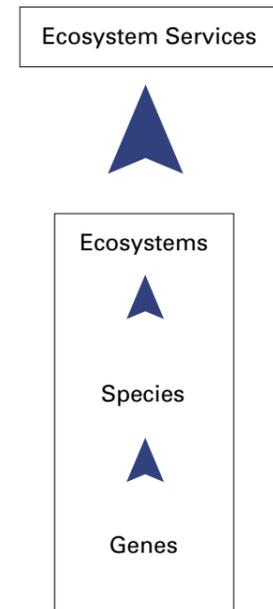
A full understanding of the status of ecosystem services in 2005 was presented by the Millennium Ecosystem Assessment. It is summarised later in this section. However, it is useful to also understand the status and trends among the building blocks of biodiversity – genes, species and ecosystems – which function together to provide these services that are critical to our wellbeing. Biodiversity is formally defined by the Convention on Biological Diversity as “**the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems**” . Evidence suggests that a diverse system will be more resilient when faced with environmental change and thus show greater ecosystem adaptability. In essence, a greater diversity of species performing similar functions within an ecosystem is likely to result in a greater probability of ecosystem processes being maintained in the face of environmental change (McCann, 2000). An understanding of the current status of biodiversity should include consideration of all three components and merits consideration from social, cultural, and geopolitical perspectives as well.

At the genetic level

A systematic effort to measure diversity at the genetic level for all species has, understandably, not been undertaken. However, the benefits of bioprospecting, or searching for useful genetic resources in plants, animals and microorganisms, has resulted in increased attention being given to genetic diversity (Wildman, 1998; Young, 1999). Genome mapping projects started with a focus on microorganisms, particularly those that are human pathogens, but more recently were given a significant boost by the human genome project and have now covered several important vertebrate and plant species.

Studies have documented the incorporation of genetic material from domesticated animals and crop species into wild relatives (e.g. Davison et al., 1998; Linder et al., 1998; Wilson, 1997). In addition, it is very likely that at least some genetically modified organisms (GMOs) will hybridize with their wild relatives, but the potential frequency, extent and consequences of this hybridization are not well understood (Hails, 2000). Widespread use of only a few commercial species or plant cultivars is also resulting in the loss of genetic diversity. Generally, genetic diversity declines as populations are reduced in size or disappear. Reduced genetic diversity, or increased inbreeding, ultimately leads to a loss of adaptation (evolutionary) potential, demonstrated through effects such as increased susceptibility to disease (Keller and Waller, 2002; Wolfe, 2000) or reduced reproduction.

GMOs are a particularly controversial aspect of modifying genetic diversity. GMOs have been advocated as a basis for increasing food production without converting more land to cultivation, reducing chemical inputs, and making crops more nutritious. These claims, however, are often balanced by concerns that GMOs may have impacts on lands and ecosystems other than the lands under cultivation; social, cultural, and equity concerns have also arisen, sometimes voiced as a worry about “corporate monopolies on our food chain” . Despite much debate, considerable uncertainty about risks remains within the biotechnology field, so much so that the concept of “precaution” is being addressed in concrete and sometimes controversial ways. Perhaps the single most important factor in making progress within this field is the development of reliable information and analysis, in fields of biology, ecology, law, economics, ecosystem management, and social policy.



At the species level

The 2004 IUCN Red List of Threatened Species reports on more than 15,000 threatened species, including 23% of mammals, 12% of birds, and 31% of amphibians – the species groups for which the most information is available. Preliminary studies on other major taxa indicate that more than 30% of reptiles and fishes are also threatened. Very little is yet known of the level of threat facing invertebrates (a group which contains very large numbers of species), but early indications are that the great majority of species in freshwater habitats are under extreme threat (Baillie et al., 2004).

The Red List Index for birds shows a steady deterioration in threat status of the world's birds from 1988 to 2004. The situation is even more serious for amphibians, the taxa for which a preliminary Red List Index indicates a substantial deterioration in threat status since 1980 (Baillie et al., 2004).

An evaluation of major threats to species was conducted as part of the 2004 Global Species Assessment. Most species faced multiple threats. Habitat loss or degradation affected 83% of threatened mammals, 89% of threatened birds and 91% of plants sampled. Direct loss/exploitation affected 34% of mammals, 37% of birds and 7% of plants. Invasive alien species affected 30% of threatened birds (but 67% of threatened birds on islands), 11% of threatened amphibians, and 8% of threatened mammals. Hunting/trade activities affected 29% of mammals, and 28% of birds but only 1% of plants (Baillie et al., 2004). Estimates suggest commercial fishing has depleted predatory fish communities to 10% of their pre-industrial biomass (Myers and Worm, 2003). While the direct threats have been quantified, there is also a need to recognise that most of these threats are themselves a result of complex underlying socio-economic factors, often linked to globalization. Since 1600, approximately 485 animal and 584 plant species have been certified extinct and more than 50% of those extinctions occurred within the last century, indicating that the rate of extinctions is increasing. Where the cause of extinction is known, invasive species are the primary factor (Smith et al., 1993).

At the Ecosystem Level

Ecosystems are the complex units of species and the non-living environment with which they interact. A significant portion of land ecosystems have already been degraded beyond the point where they can consistently provide the ecosystem services on which people rely. Soil erosion and complete removal of vegetation are unfortunately increasingly common, but most frequent in tropical countries. Over 250 million people are directly affected by desertification (UNCCD, 2005). Unless they are the subject of active effective management/conservation programs, services provided by these degraded systems will continue to decrease.

The World Resources Institute undertook a Pilot Assessments of Global Ecosystems in 2000. Conditions across all five ecosystems studied were reported to be uniformly declining (see Table 4). Similarly, UNEP-WCMC has attempted to inventory the current understanding of global terrestrial, marine and inland water biodiversity (WCMC, 2000).

The Millennium Ecosystem Assessment (MA), while focusing on ecosystem services, also reported on the status of the ecosystems. The report noted that more land has been converted for agriculture since 1945 than during the 18th and 19th centuries combined. Ecosystems that have been most significantly altered include marine and freshwater systems, temperate broadleaf forests and grasslands, Mediterranean forests and tropical dry forests. Dams have fragmented more than 40% of the large river systems in the world. More than half of tropical dry forests have been lost (Millennium Ecosystem Assessment, 2005).

At the Ecosystem Service Level

The MA reports that 60% of the world's ecosystem services are degraded to the point where they no longer provide what we need in the way of food, water, clean air, fuel and many other services. Human exploitation of ecosystems has resulted in increased production of a small number of services such as crops and livestock. Unfortunately, that is not the case across the spectrum of other services provided by nature (Millennium Ecosystem Assessment, 2005).

More specifically, the MA notes that more land was converted for crops from 1950-1980 than during the

[Table 3] - The Status of Major Global Ecosystems

Ecosystem	Condition	Trend	Population Pressure
Coastal ¹	<ul style="list-style-type: none"> 20% of land area 19% of land within 100 km of coastline is altered for agriculture or urban use. 	<ul style="list-style-type: none"> 5-80% of original mangrove lost 	<ul style="list-style-type: none"> 39% of world's population lives here
Forest ²	<ul style="list-style-type: none"> 25% of land area only 40% undisturbed by human activity 80% of endemic bird areas are in forests 	<ul style="list-style-type: none"> 20% decrease since pre-agricultural times since 1980, at least 10% decline in developing countries 	<ul style="list-style-type: none"> Forest resources directly contribute to livelihood of 90% of the 1.2 billion of people living in extreme poverty
Freshwater ³	<ul style="list-style-type: none"> <1% of land area but services estimated at USD trillions large dams impound 14% of world's runoff 	<ul style="list-style-type: none"> 50% of world's wetlands lost during the 20th century 	<ul style="list-style-type: none"> 1.5 billion people rely on groundwater as their only source of drinking water
Grasslands ⁴	<ul style="list-style-type: none"> 40% of land area almost 50% of Centres of Plant Diversity include grassland habitat 12% of threatened birds are specific to grasslands nearly 49% lightly to moderately degraded 	<ul style="list-style-type: none"> significant loss due to conversion for agriculture 	<ul style="list-style-type: none"> more people live in grasslands than in forests (800 million vs. 446 million in 2000)
Agroecosystem ⁵	<ul style="list-style-type: none"> 28% of earth's surface 31% is cropland (primarily cereal production) with 69% under pasture 	<ul style="list-style-type: none"> pasture area increasing at 0.3% annually areas under irrigation increasing ~1.6% annually 	<ul style="list-style-type: none"> agroecosystems provide 94% of the protein and 99% of the calories consumed by humans

1 Burke et al., 2000, 2 Mathews et al., 2000., 3 Revenga et al., 2000, 4 White et al., 2000, 5 Wood et al., 2000

150 years from 1700-1850. Since 1960, flows of reactive nitrogen have double and of phosphorus have tripled. During the last several decades of the 20th century, 20% of coral reefs and 35% of mangrove forests were lost or severely degraded (Millennium Ecosystem Assessment, 2005).

Although noting that evidence remains incomplete, the MA experts warned that the ongoing degradation of 15 of the 24 ecosystem services examined is increasing the likelihood of serious impacts on human wellbeing. These impacts may include the emergence of new diseases, sudden changes in water quality, creation of "dead zones" along the coasts, the collapse of fisheries, and shifts in regional climate (Millennium Ecosystem Assessment, 2005).

The four main findings of the MA include:

- Humans have changed ecosystems more rapidly and extensively in the last 50 years than in any other period.
- Ecosystem changes that have contributed substantial net gains in human wellbeing and economic development have been achieved at growing costs in the form of degradation of other services.
- The degradation of ecosystem services could grow significantly worse during the first half of this century and is a barrier to achieving the UN Millennium Development Goals.
- The challenge of reversing the degradation of ecosystems while meeting increasing demands can be met under some scenarios involving significant policy and institutional changes.

What is being done?



There is a growing urgency for the world's poor and the environment. The time to act is now and the focus of those actions can be viewed under three general umbrellas – improving governance, increasing investment and employing relevant technology. Each of these must be addressed in an integrated manner as they are interlinked and not mutually exclusive.

Improving human wellbeing

Governance

Since its launch in the public arena in the 1980 World Conservation Strategy, "sustainable development" has become a key objective of the international community. Global commitment to the vision of sustainable development and poverty reduction has been reaffirmed several times, including in 1992 at UNCED, in 2000 at the Millennium Summit and in 2002 at the World Summit for Sustainable Development (WSSD). Several documents have resulted, including Agenda 21, the Millennium Development Goals and the Johannesburg Plan of Action. In addition, multilateral agreements such as the Framework Convention on Climate Change, the Kyoto Protocol, and the Montreal Protocol have been established. Each of these provides more detailed actions for achieving the global objective of sustainable development. While these instruments show some global-level commitment to sustainable development and poverty reduction, in other venues the situation is not so clear. Within the World Trade Organisation and major private sector companies, neither the concept of sustainable development nor the role the environment plays, appears to be seriously considered in their operations.

Although political commitments have been made, operationalising them has proven to be a challenge. Lack of development finance remains a major problem for developing countries. Despite the stated commitments to development, negotiations of the WTO continue to proceed at a glacial pace with obstructions due to vested interests in all countries impeding progress towards our stated goals.

Investment

Overseas Development Assistance (ODA) to developing countries increased to its highest level ever: USD 78.6 billion in 2004 (OECD, 2005). While these increases are welcome, they still represent only 0.25% of the combined Gross National Income (GNI) of the OECD Development Assistance Committee member countries and falls far short of the 0.7% target. The United Nations has estimated that achieving the MDGs will require an additional USD 50 billion annually.

However, this focus on ODA support for developing countries misses the fact that by far the most significant financial input into these countries comes from other sources of investment. The primary financial supporter is foreign direct investment and the amount from those sources has grown to more than five times official assistance (World Bank, 2005b). As noted from Figure 2, this investment is highly volatile and can change rapidly, as happened during the fall of the Asian 'tiger' economies in the late 1990s.

Technology

Many governments, in all parts of the world, are making major public investments in technology. Malaysia, for example, plans to spend USD 8 billion on developing biotechnology over the coming decade or so. Investments by the private sector may be even larger on a global scale. Important areas of technological innovation have been especially dramatic in the field of information technology, with the internet now making it possible to download information on virtually any topic at any time. Related communications technology is putting people easily in touch with each other, so that ignorance is no longer a significant constraint to action in favour of the environment. In contrast, the amount of information now available is often overwhelming and a major challenge is managing the overflow of information, as well as dealing with issues of proprietary rights.

Conserving Biodiversity and Ecosystem Services

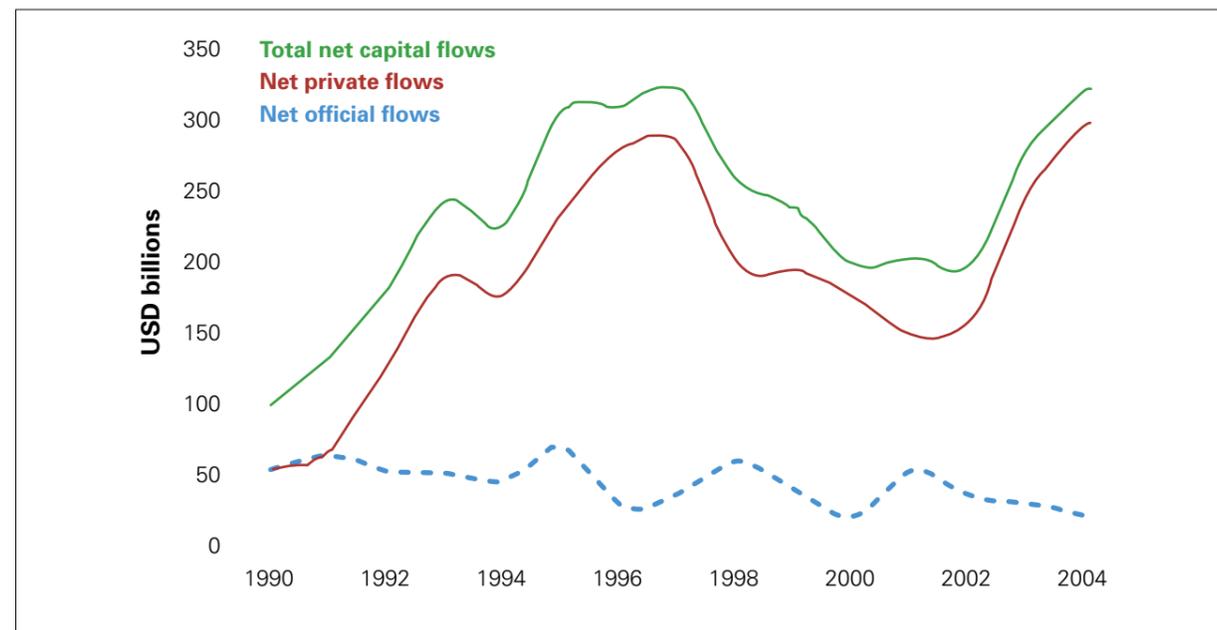
Governance

At the international level, the importance of biodiversity and ecosystem services to human wellbeing has been enshrined in the text of several multilateral environmental agreements. For example, the preamble to the Convention on Biological Diversity (CBD) notes "...the intrinsic value of biological diversity and of the ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values of biological diversity and its components". The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is "Conscious of the ever-growing value of wild fauna and flora from aesthetic, scientific, cultural, recreational and economic points of view". The Johannesburg Plan of Implementation highlights the goal of reducing the current rate of loss of biodiversity by 2010 (para. 44) while the Millennium Development Goals (MDGs) include "Ensuring environmental stability" (Goal 7) as a contribution to alleviating poverty.

However, as for the situation with development, despite stated political commitment to the environment, little attention has been paid to operationalising these promises. Debates within the major multilateral institutions such as the Doha and Monterrey negotiations do not include environmental considerations.

With respect to integrating environment into poverty reduction strategy papers, a recent World Bank review noted that there was (a) considerable variation across countries; (b) an average level of mainstreaming that is low, and (c) a strong tendency for full PRSPs to better integrate environmental considerations than interim PRSPs (World Bank, 2004b). Relating to the MDGs and MDG 7 in particular, a UNDP review (2005) noted that while most countries (86%) report some environmental change, only four countries have reported on all eight global indicators. Overall, there is lack of progress in reversing the loss of environmental resources as shown by trends in forest cover, emission of greenhouse gases, and energy use. Reporting on environmental sustainability is a challenge for many countries, due primarily to unreliable and inaccessible data and a lack of statistical capacities and monitoring mechanisms.

[Figure 2] - Financial flows to developing countries 1990-2004



Source: World Bank, 2005b

Investment

Some of the major sources of investment for biodiversity conservation come from the multilateral institutions - especially the Global Environment Facility (GEF) and the World Bank - and bilateral donor assistance. The GEF operates the financial mechanism of the Convention on Biological Diversity and as such provided significant funding for global biodiversity conservation. In its first decade of operation, GEF provided nearly USD 1.1 billion for about 200 biodiversity projects with protected-area components. GEF received commitments of USD 3.1 billion for its third replenishment covering 2002-2006 of which USD 800 million was earmarked for biodiversity. Between 1988 and 2003, the World Bank Group approved 233 projects, which fully or partially support biodiversity conservation. For these projects the Bank's lending totalled about USD 1.8 billion (UNEP, 2005).

ODA activities targeting the objectives of the Convention on Biological Diversity by 19 OECD countries for 1998-2000 indicated a slightly declining trend with 1.09, 1.03 and 0.87 billion USD respectively (Figure 3). Average annual bilateral biodiversity-related aid, and annual average percentage of total bilateral ODA by 19 countries provided an annual average biodiversity aid of 995 million dollars, which accounted to only 2.7% of the total bilateral ODA (UNEP, 2005).

At a more specific level, a recent estimate of global expenditure on existing protected areas is around USD 6.5 billion per annum, mostly in the developed world (James et al., 2001). Although non-governmental and private sector funding are becoming an increasingly important component of protected area finance (Krug et al., 2001), two sources - domestic government budgets and international donor assistance - provide the bulk of funding. In the developing world as a whole, one recent estimate suggests that public national park budgets amount to between USD1.3 and 2.6 billion per year (Molnar et al., 2004). As a share of total government spending, the sums involved are relatively small.

Technology

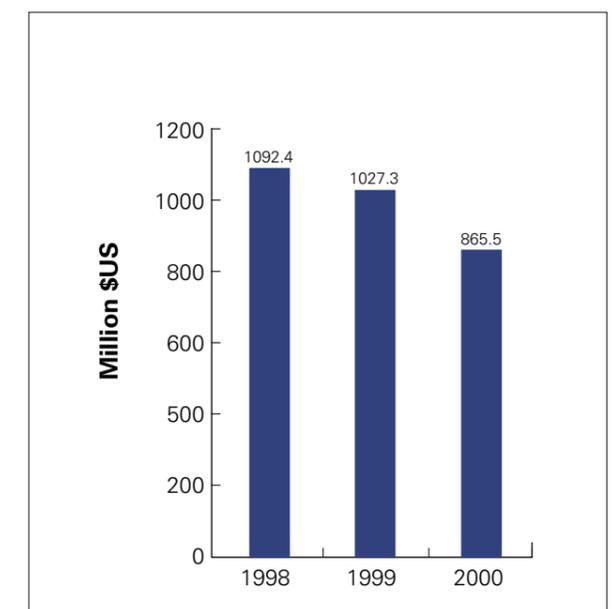
The rapid growth and development of information technology has massively increased availability of and access to knowledge. Initiatives such as the Conservation Commons, in which IUCN plays a

prominent role, are seeking to ensure the widest possible availability of relevant and up-to-date information presented in a form that can readily be used.

Another major area of technology that is of great concern to the environmental community is biotechnology, covering everything from genetic modification to bioremediation. The major investments being made in biotechnology have led some to suggest that the 21st century will be 'the biological century'. Scientists learn enough about the way life is organised that environmental management can become much more science-driven. But this will need to be balanced by significant precaution to ensure that the costs of the new technology are fully considered in public decision-making, and that ethical considerations continue to drive our work.

Technology will be particularly important to provide the means by which to deal with some of the main threats facing reliable delivery of ecosystem services, namely climate change and invasive alien species. In both cases, tools and information are needed to effectively manage ecosystems that are vulnerable to these threats and to ensure sustainable livelihoods for those living in these areas.

[Figure 3] - Biodiversity-related aid, commitments 1998-2000 by 19 OECD countries



Source: UNEP, 2005

Remaining challenges



First and foremost, the case for supporting delivery of ecosystem services must be established within other components of the development agenda. Biodiversity conservation and the resulting support to human wellbeing must be integrated into all actions intended to reduce poverty and achieve sustainable livelihoods. Achieving this integration will depend to a large extent on general understanding of the role of biodiversity in human welfare. A more targeted communications and public awareness strategy should be undertaken.

Achieving this integration will also depend on continuing to explore and research the link between biodiversity, ecosystem services and human welfare, particularly in economic terms. If we better understand the status and trends in our ecosystems, we will make better decisions. While research and development are important, other aspects of knowledge management, such as support for knowledge-sharing networks and capacity building will also be vital.

Last, but by no means least, implementing an integrated programme of sustainable development that incorporates environmental concerns will require partnerships, both among traditional allies as well as new relationships across sectors and disciplines.

In addition, IUCN believes that addressing the drivers of change that are impairing delivery of ecosystem services requires action at three distinct levels – improving governance of natural resources, increasing investment in biodiversity for people, and adopting relevant technology, specifically landscape-scale approaches to management for delivery of ecosystem services.

Improving Governance of Natural Resources

Efficient and reliable delivery of ecosystem services is an important component of poverty reduction and sustainable development. The WSSD Johannesburg Plan of Implementation described good governance as being “essential for sustainable development” and successful achievement of the MDGs will certainly require improved coordination, synergy and partnership among all participating agencies and organizations. At Johannesburg, governments emphasised the importance of partnerships in achieving sustainable development and one of the MDGs (MDG 8) is specifically directed at partnerships. To that end, the potential role of the private sector and civil society in development work, including the conservation of biodiversity, must be welcomed and strengthened.

Increasing Investment in Ecosystem Services for People

A corollary to the mainstreaming of biodiversity is the need to ensure adequate resources (both human and financial) to implement actions. All countries should seek to increase the efficiency of current expenditures for supporting ecosystem services across all sectors (i.e. agriculture, fisheries, forestry and economic development as well as environment ministries). In some cases, decreasing expenditures for subsidies that are detrimental to the provision of ecosystem services may be the most efficient way forward. At the same time, increased amounts of development funding can be directed at activities that incorporate the conservation and sustainable use of biodiversity, and incentives for biodiversity conservation at the community level can be improved. Capacity building and technology transfer programmes must also take biodiversity into consideration. Finally, the need for private investment is paramount and this will require the creation of enabling conditions including reform of natural resource tenure and raising awareness among investors, insurers and entrepreneurs to stimulate more investment in biodiversity-friendly enterprise

Adopting relevant Technology, especially Landscape-level Management

Landscape-scale management acts on a scale broad enough to recognize the role of, and subsequently address, all critical influencing factors and stakeholders that shape land use decisions. Good landscape management will fulfill societal needs by equitably balancing trade-offs between the productive, social and environmental requirements of current land use. To function properly it requires supportive policies, incentives and institutions that are capable of operating at that scale. It means conserving and restoring ecosystems so that they can fulfill their potential to support livelihoods. It means ensuring the concerns of people depending on those ecosystems are taken into consideration when decisions are taken. It also means incorporating the understanding of how a management action in one part of the landscape may impact another and allowing flexibility and adaptation in management responses for changing situations.

Building on these three key challenges, and employing the key strategies of partnerships and knowledge mobilisation, a suite of more specific approaches is suggested as fundamental to success. We propose some environmental ‘First Steps’ that should be initiated now if we are to secure our future. These First Steps are not discrete victories but are rather catalysts for medium and longer-term support, and security for the future. These actions are not necessarily mutually exclusive and, indeed, progress on one can catalyse action in others. Integrated interventions and not isolated strategies will be needed to achieve the MDGs, as the Millennium Ecosystem Assessment has noted. Finally, it is important to recognise that, for many of these actions, an influx of money is not the only answer. A change in behaviour is needed. The political will for change is a necessary foundation for achieving success.

Improving governance for delivery of ecosystem service

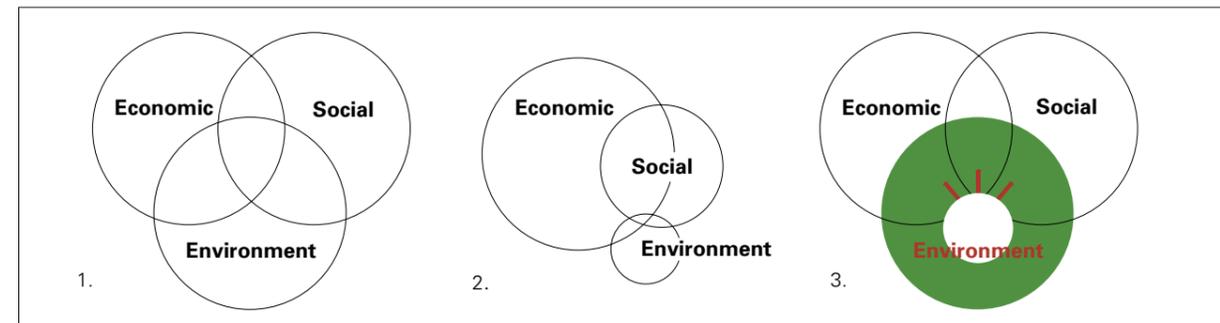
1. Integrate ecosystem management for human wellbeing into development planning and implementation

WHY?

Sustainable development cannot be achieved in isolation from ensuring economic wellbeing, equity, environmental health and addressing social development goals. However, the current reality is that efforts to achieve sustainable development have tended to put most emphasis on economic development, often at the expense of social and environmental factors. But the goods and services that drive our economy and support our social systems stem largely from a healthy functioning environment. Imagine the World Trade Organisation without discussions about cotton or shrimp. A key concern following the December 2004 tsunami in the Indian Ocean was the fate of fisherfolk that had lost their livelihoods. Ensuring supply of these commodities should be the objective of all sectors of society, not just the environmental community. IUCN calls for the three pillars of sustainable development to be more equitably balanced by integrating environmental concerns into economic and social development thinking as shown in Figure 4. Balancing these pillars will support achievement of all MDGs.

A number of key national planning processes have been conducted over the last several years to establish national investment priorities to ensure environmental sustainability. These processes should be integrated and the environment mainstreamed into future planning processes such as Policy Reduction Strategy Papers. Some of the more intractable problems facing ecosystems and threatening livelihoods are those of climate change and invasive alien species. An integrated approach to these issues will be essential to success.

[Figure 4.] The three pillars of sustainable development: 1/ the theory 2/ the current situation 3/ the way to move ahead.



HOW?

1. Implement comprehensive, integrated, sound and accountable national development strategies which draw on, inter alia, existing National Sustainable Development Strategies, sectoral strategies, and national strategies and action plans pursuant to multilateral environmental agreements.
2. Engage environmental ministries and agencies in promoting the role and value of ecosystem services in economic development including in the context of international economic agreements.
3. Raise awareness within administrations of all sectors at the national level with respect to the role of ecosystem services in delivering their development objectives.

FIRST STEPS

1. Review existing planning and management documents, such as Poverty Reduction Strategy Papers, to identify opportunities where improved ecosystem management can contribute to achieving poverty reduction.
2. Ensure that new or revised national poverty reduction and growth promotion planning documents fully integrate existing national ecosystem management plans (e.g. National Strategies for Sustainable Development, plans and programmes of MEAs, and sectoral strategies).

2. Decentralise natural resource management

WHY?

Many of the rural poor live in close proximity to abundant natural resources although they are often prevented from directly accessing and using them. Typically forests, fisheries and water resources in the majority of developing countries come under the control of State agencies; it is the State that takes the decisions as to how these resources should be managed and, in theory at least, collects and reallocates any revenue that is due. Natural resource use under centralised control tends to be characterised more by changeable and negotiable (sometimes extra-legal) privileges rather than clear and predictable rights. It is important to decentralise to the lowest level capable of ensuring sustainability while empowering local communities and ensuring adequate capacity building.

Experience in both the forest and water sector over the past twenty years has shown that devolving decision-making power over the use and management of natural resources to local communities can yield tangible benefits in terms of livelihood and food security, new and more equitable power relationships (including for women) and better environmental stewardship. For example, IUCN found that the devolution process in Tanzania resulted in over 500 villages declaring new forest reserves (Alden Wiley and Mbaya, 2000) and, in the Shinyanga region, monthly average income from locally-managed woodlands alone exceeded USD 14 per person (Monela et al., 2004). This compares favourably to average monthly rural expenditure of USD 8.5 and is almost double the estimated basic needs poverty line of USD 7.6 (United Republic of Tanzania, 2002).

To be successful, decentralisation of natural resource decision-making needs:

- a) A clear legal and policy framework with clear allocation of roles and responsibilities and clarity and consistency in implementation.
- b) A clear set of agreed rules and conditions to govern the process of transfer
- c) Both upward and downward lines of accountability; it is not just a question of ensuring that local communities representatives report back to the centre they must hold themselves accountable to the resource user
- d) Both incentives and clearly defined and enforceable controls.
- e) Transfer of a full range of rights that can transform a sustainably managed natural asset into cash income. This means that local communities must not only be granted access and use rights but also the right to trade in the natural resource commodity that they produce.

HOW?

1. Work to ensure active engagement of all stakeholders in natural resource management including ensuring that local rural communities know what exactly are their current rights and entitlements and how they can ensure that these are recognised and enforced
2. Focus necessary enforcement and control measures on safeguarding clearly identified and defined national and global goods.
3. Commit to devolution of natural resources to local communities / municipalities and identify the rules and conditions to govern the process

FIRST STEPS

1. Initiate incentive schemes that liberalise resources used by the poor and reward good environmental stewardship.
2. Remove constraints (e.g. inaccessible credit markets, inequitable tenure arrangements) that limit poor people's sustainable use of natural resources.

3. Mainstream the multilateral environmental agreements in development planning and implementation

WHY?

Numerous multilateral environmental agreements are in effect as of 2005, some older than three decades and most with a roster of Parties that includes the majority of the nations of the world. Within the context of these various agreements, Parties have taken much time and effort to come to agreement upon plans of action to address the specific issues within their mandate. Each of these agreements individually recognises their potential role in sustainable development and poverty reduction. However, political, financial and operational constraints impair their full participation.

One way to improve efficiency and effectiveness of these agreements, and enhance their role in sustainable development, is to promote harmonization among them. UNEP has taken some initial steps in this direction by working to harmonize national reporting and information management for biodiversity-related conventions under its mandate. On the direction of the Parties to the CBD, a Biodiversity Liaison Group has been formed with the secretariats of CBD, CITES, CMS, World Heritage and Ramsar. However, successful implementation of all these agreements depends not only on the support of Secretariats and UNEP or on adequate financing, but also on commitment at the national level to the concept and practice of harmonisation. Each Party to each MEA should resolve that harmonisation is a priority.

With national-level political commitment in place, potential resources for harmonized action among MEAs can be found beyond the environment sector. Current contributions to ODA amount to about USD 80 billion annually (OECD, 2005). While ODA should not be the only means by which countries should finance their commitments to the MEAs, it could form a significant foundation upon which to build. Doubling of international development aid to at least 0.7% of the GNP of developed countries has been one of the most specific and concrete suggestions to come out of the UN Millennium Project work. Ensuring that some of that increase is targeted to environmental management that supports poverty reduction is important.

Finally, effective implementation of MEAs will require influence and cooperation among other sectors. Arguably, the most influential of all multilateral institutions, although it is not traditionally considered as an environmental institution, is the World Trade Organisation. Adequate support for the environment, and, more specifically, successful implementation of the multilateral environmental agreements, will depend on enhanced relationships with the WTO and better mutual understanding of concerns.

HOW?

1. Promote harmonisation among MEAs at national level and ensure that this support is evident at international fora and Conferences of the Parties.
2. Work towards increased allocations for environmental management within development assistance programmes as well as ensuring the role of the Global Environment Facility in supporting conservation for development.
3. Promote initiatives within the Doha round of negotiations of the WTO that will enhance delivery of ecosystem services, including removal of agricultural subsidies, market access for least developed countries, and elimination of tariffs against value-added processing in developing countries.

FIRST STEPS

1. Support harmonisation among the MEAs.
2. Ensure a full and effective fourth replenishment of the Global Environment Facility that reflects the increased scope of work requested of the GEF.
3. Promote MEAs participation in relevant discussions of the Bretton Woods Institutions.

4. Promote equity, especially gender equity, in natural resource management

WHY?

The relationship between wealth, poverty, inequity and the natural environment is highly complex. In many cases, economic growth for wealth creation leads to environmental degradation. In other cases, environmental degradation exacerbates poverty and inequity. In some places, economic growth makes people more aware of their distance from sustainable ways of living, leading to the current movement in some richer countries for a less energy- and resource-intensive pattern of consumption. However, the demand generated in affluent societies is often met through production of commodities in developing countries, frequently with adverse environmental impacts.

Poor people are often seen as being victims and unwilling agents in environmental degradation at the same time. However, poor people often manage their environment in sophisticated and sustainable ways. Traditional exclusionary approaches to nature protection have had serious adverse effects on the poor by limiting their access to biological resources and ecosystem services necessary for their livelihoods. Conversely, poverty reduction efforts that do not consider environmental issues can have adverse effects on natural resources. Neither situation is likely to be sustainable in the long term. Community-initiated conservation efforts have been documented in many countries. These have often contributed both to sustainable livelihoods and to conservation of biodiversity and natural resources.

Women are 52% of the population and are active actors in development. Nevertheless, women often have unequal rights (vis-à-vis their male counterparts) and suffer from an unequal distribution of, and control over, resources. Without a source of income, secure land tenure, or control over resources, it is more often women, and their children, who suffer from extreme poverty.

The different roles and responsibilities of women and men are closely linked to environmental change and wellbeing. This is true both for how women and men affect the environment through their economic and household activities and how the resulting environmental changes affect people's wellbeing. Understanding these gender differences is an essential part of developing policies aimed at both better environmental outcomes and improved health and wellbeing.

HOW?

1. Persuade national governments to recognize the role of indigenous peoples and local communities in establishing and managing the natural resources that they utilise.
2. Support the full and effective implementation of the Beijing Declaration and Platform for Action and The Convention on the Elimination of All Forms of Discrimination against Women (CEDAW).
3. Increase primary school completion and secondary school access for girls; ensuring secure tenure of property to women and equitable access to natural resources and the flow of financial and other resources derived from them.

FIRST STEPS

1. Improve women's access to natural resources and participation in environmental decision-making.
2. Review existing conservation and development policies to ensure effective participation of indigenous and local communities.

Investing in Ecosystem Service

5. Mainstream biodiversity concerns into business planning and operations

WHY?

The direct causes of biodiversity loss include habitat destruction, over-exploitation, pollution and invasive species. Behind these proximate causes lies a rapidly globalizing economic system, increasingly driven by international trade and private investment. The vast majority of the world's development is undertaken in the private sector and the important role played by corporations was acknowledged by the Asian Development Bank in their Asian Environment Outlook 2005 (ADB, 2005). The challenge presented by the overwhelming influence of the private sector is complemented by the outstanding opportunity it presents to harness their commitment and resources to long-term sustainability.

In particular, the private sector has the entrepreneurship and capital that are badly needed for investment in maintaining and providing ecosystem services on a sustainable basis. The World Summit on Sustainable Development and the resulting debate around MDGs has provided a sustainable development focus for businesses perhaps more than other parts of the society. The private sector is increasingly expected to shoulder part of the responsibility for achieving the MDGs. In meeting that expectation, it has an unparalleled opportunity and potential to conserve and enhance ecosystem values as a basis of sustainable development. Finally, engagement of the private sector is a key partnership that will be needed to achieve MDG 8.

HOW?

1. Develop, promote and implement standards and tools for corporate social responsibility and accountability.
2. Contribute to the creation of level playing field (policies, laws, standards) such that environmental leadership and performance by business is rewarded by markets, creating further incentives for sector-wide improvements.
3. Strengthen markets for ecosystem services, and identify new ones, in which companies can profitably invest for increasing value for their shareholders while enhancing their contribution to poverty alleviation and nature conservation.
4. Develop aggressive private sector outreach programmes to promote approaches and technologies that have the potential to reduce environmental damage as well as increase profitability.
5. Support participation of industry in initiatives such as the Global Compact – a voluntary initiative to unite both governments and civil society to work towards poverty reduction.

FIRST STEPS

1. Commit to the use of tools such as “triple bottom line” accounting and sustainability audits.
2. Commit to fully implement the recommendations of the World Commission on Dams and the Extractive Industries Review.
3. Promote incorporation in the insurance industry of environmental concerns in risk assessments and liability for environmental damage/degradation in relevant policies.

6. Adapt to deal with the expected impacts of climate change

WHY?

The Intergovernmental Panel on Climate Change, reflecting a massive and rapidly-growing literature, leave no doubt that the climate is changing, and many indications are that the changes will be both rapid and essentially irreversible. During the last century, global temperatures climbed 0.6° Celsius, the largest increase in at least one thousand years. As a result, snow cover is decreasing, glaciers are retreating, rainfall patterns are changing, and extreme weather events are becoming more frequent.

Further warming will have a substantial destabilising effect on the natural resource base, and threaten several valuable ecosystems such as the Cape Floristic Province in southern Africa, tropical montane forests in Australia and Central America, the Arctic as well as coral reefs and mangroves around the world. Damage to these ecosystems will reduce the services they provide to society and expose the poorest and most vulnerable communities to more severe and frequent climate-related hazards. This, in turn, complicates global efforts to reduce poverty and promote more sustainable livelihoods.

While more aggressive reductions in greenhouse gas emissions are undoubtedly needed, effective and efficient sustainable development depends upon climate change adaptation becoming a part of natural resource policy and practice. Developing countries need to expand their access to clean energy sources. Developed countries need to promote more efficient and responsible energy consumption.

By starting now to build appropriate adaptation strategies, the shocks of climate change may be avoided, or at least minimized. In particular, adaptation to ensure sustained provision of ecosystem services is essential for the poorest, who are not only most vulnerable, but also depend most on those services. In addition to adaptation, we should also begin planning for post-2012 (Kyoto Protocol) global action to combat climate change.

HOW?

1. Improve natural resource planning and management at landscape and seascape levels including making resources available for investing in adaptive management especially in developing countries.
2. Strengthen institutional and individual capacities within conservation and development organizations, especially in developing countries, for dealing with climate change.
3. Share information between governments and their agencies, NGOs, communities, and research institutions on potential and observed climate change impacts and extreme weather events and develop disaster preparedness and recovery systems including forecasting, early warning and rapid response measures.

FIRST STEPS

1. Fully fund and implement National Adaptation Plans of Action.
2. Restore ecosystems at vulnerable sites to buffer livelihood options and conserve biodiversity from projected impacts of climate change.
3. Promote the use of renewable energy as an important tool for enhancing livelihoods.

Managing at Landscape Scales

7. Explore and support payments for ecosystem services

WHY?

The Millennium Ecosystem Assessment has provided a comprehensive overview of the ecosystem services upon which humans depend. Many of these services have been shown to have significant economic value in terms of their contributions to production and consumption (NRC, 2004). Yet, most ecosystem services remain virtually free-of-charge at the point of use. Where supplies of ecosystem services are plentiful, relative to human demand, the lack of a price or some other mechanism to ration their use poses little problem. Increasingly, however, the growing demand for ecosystem services combined with external pressures on the ecosystems that provide them have led to scarcity, congestion, conflict and growing risks to human wellbeing. In this context, the continuing failure of markets to charge for the use of ecosystem services (or to reward the provision of ecosystem services) has become an increasingly severe constraint on long-term economic performance and sustainable development.

While most ecosystem services are not traded in markets, there are important exceptions. Two of the most well-established markets for ecosystem services are organic foods and the eco-tourism industry. The latter has been described as the fastest growing sector of the largest industry on earth, accounting for annual exports of over USD 100 billion (TIES, 2005). The market value of organic foods was reported to have reached USD 25 billion in 2003 (IFOAM, 2005). In both cases, the link between sales of consumer products and services, and the supply of ecosystem services is indirect but significant. One of the best-known examples of direct trade in ecosystem services is the growing market in carbon emission reduction and sequestration services. Valued at about USD 330 million in 2003, this relatively young market is set to grow dramatically over the coming years, following the entry into force of the Kyoto Protocol (Lecocq, 2004). The carbon market has clearly demonstrated the feasibility of 'internalizing' ecosystem services in economies, even at an international scale.

HOW?

Experience shows that creating market incentives for ecosystem services is possible, but not simple. What is needed is:

1. Sound science to document the volume, value and costs of providing ecosystem services, under alternative management regimes.
2. Political will and/or institutional commitment to establish payment and trading regimes for ecosystem services, whether on a voluntary basis, under local or national law, or as part of international agreements.
3. Institutional innovation to create viable business models as well as credible processes for monitoring, evaluation and public accountability.

FIRST STEPS

1. Promote legislative frameworks and voluntary initiatives that enable markets for ecosystem services including markets for carbon emission reduction and sequestration, watershed management, and biodiversity conservation.
2. Promote true valuation of ecosystem services, including removal of subsidies and perverse incentives.

8. Ensure at least minimum environmental flows in all water management schemes

WHY?

An environmental flow is the water provided within a river, wetland or coastal zone to maintain ecosystems and their benefits. Development of water resources up-stream has consequences for the livelihoods of downstream users and ecosystems. Reducing the river flow into a delta mangrove forest, for example, affects fisheries and the ability of those forests to protect communities from seasonal storms.

Adequate environmental flows provide critical contributions to river health, economic development and poverty alleviation. They ensure the continued availability of the many benefits that healthy river and groundwater systems bring to society. This is key to directly delivering on MDG 7 and indirectly supporting achievement of the health-related and education-related MDGs.

The price of not providing environmental flows should not be underestimated. It is increasingly clear that, in the mid and long term, failure to meet environmental flow requirements has disastrous consequences for many river users and societies downstream. However, addressing the water needs of aquatic ecosystems will often mean reducing the water use of one or more sectors. These are tough choices, but they have to be made to ensure the long-term health of the basin and the economic activities it encompasses.

There is no simple figure that can be given for an environmental flow in a specific river basin. Much depends on stakeholders' decisions about the future character and health status of a river basin ecosystem. Scientists and experts can help inform such decisions by providing information and knowledge on how a river, wetland or coastal ecosystem will evolve under various flow conditions.

HOW?

1. Ensure ecologically sustainable access to water and sanitation for all and accelerate the development and implementation of integrated water resource management (IWRM) plans with emphasis on meeting basic human needs and guaranteeing environmental flows to maintain ecosystem services to people and biodiversity.

FIRST STEPS

1. Apply environmental flow assessments as part of all river basin planning to ensure sustainable livelihoods downstream.
2. Implement adaptive management plans, including restrictive management, to deliver water resources.

9. Incorporate representative networks of protected areas into landscape management

WHY?

Protected areas play a critical role in enhancing the livelihoods of poor people by sustaining vital ecosystem services, including clean water and sustainable fisheries stocks. Achieving the Millennium Development Goals will require new and innovative approaches to protected area management, linked to social and economic strategies, particularly those which address poverty reduction and climate change adaptation strategies. Additionally, the management of protected areas needs to be strengthened to ensure that such areas can most effectively conserve biodiversity while delivering the ecosystem services required for livelihoods.

The Vth IUCN World Parks Congress in 2003 celebrated one of the significant achievements of the last century: the establishment of protected areas over 11.5% of the earth's surface. This represents a huge increase from 1962 when protected area coverage was 3% of the earth's surface. Significantly, the majority of the growth of protected areas in the last decade has been in developing countries and within terrestrial ecosystems. However, significant gaps remain in relation to the coverage of protected areas in the marine, freshwater and coastal ecosystems.

HOW?

1. Ensure targeting and designing of new protected areas which better protect ecosystem services, through approaches such as ensuring that watershed areas are included within protected area boundaries. Special attention should be given to agreeing on a system of marine protected areas, including on the high seas in areas outside of any national jurisdiction.
2. Strengthening the management of protected areas, particularly through increasing the level of finance available for protected area management, and through targeted capacity development initiatives. While it is imperative that we recognise the need for protected areas and gazette them accordingly, it is just as important to ensure that they do not become 'paper parks' and that they have the resources and human capacity to effectively deliver the goods and services required of them.
3. Linking protected areas with broader land use planning.

FIRST STEPS

1. Complete a gap analysis of ecosystem coverage by protected areas to identify key opportunities for new protected areas that can enhance local livelihoods.
2. Enhance management effectiveness of protected areas to improve delivery of ecosystem services provided by those areas.

10. Restore landscapes and seascapes to benefit people and nature

WHY?

The Millennium Ecosystem Assessment confirms that many of the world's ecosystems have undergone significant degradation with negative impacts on biological diversity and peoples' livelihoods. This degradation has been caused by human action resulting in loss of natural habitat, establishment of invasive alien species, pollution and overexploitation of available resources. The areas of degraded land involved are large. Some systems are severely degraded and will be costly to repair. Most degraded systems are still being used by people, many of whom are poor. In addition, there is a growing realisation that we will not be able to conserve the earth's biological diversity through protection of critical areas alone. The challenge is daunting.

Although the challenge is great, there is sufficient evidence for optimism. Restoration can be large-scale or small-scale, it can be carried out by one or a few individuals or via government programmes involving thousands of participants. It can be well-resourced or modestly-funded, it can involve ecosystems that can be restored quickly or those that require hundreds of years. In all cases, ecosystem restoration will enhance landscape connectivity, increase the availability of environmental goods and services, and contribute to the improvement of human wellbeing. It will also improve the biological diversity on degraded landscapes and increase the populations and distribution of rare and threatened species.

Ecosystem restoration, as a fundamental element of ecosystem management, should be a primary component of conservation and sustainable development programmes throughout the world. The conservation benefits of restoration are obvious. What is less apparent, but at least as important, is that in many instances, ecosystem restoration has also renewed economic opportunities, rejuvenated traditional cultural practices, and focused the aspirations of local communities.

HOW?

1. Identify the key drivers of ecosystem degradation, the political and economic interests behind them and whether they still currently prevail or if the degradation is simply a remnant of past land-use or economic policy. Establish which stakeholder groups are most affected by the results of degradation and identify the policy incentives required to encourage them to participate in restoration activities.
2. Focus on the key ecosystem functions that need to be restored rather than desired configurations of particular land-uses. In many cases it will be socially, economically and biologically impossible to restore a seascape or landscape to its original "pristine" condition but this does not mean that the delivery of its natural functions, including those associated with biological diversity, cannot be significantly improved.
3. Negotiate outcomes with all key stakeholders and recognise that trade-offs will be involved. Avoid centrally imposed solutions and encourage start-up activities that restore those primary ecosystem functions which can yield demonstrable livelihood benefits in relatively short periods of time.
4. Take an adaptive management approach; good ecosystem restoration cannot be completely planned in isolation – sufficient opportunity is required to permit key stakeholders reflect on progress and adjust future actions.

FIRST STEPS

1. Enhance ecosystem productivity of water basins, coastal zones and forests through landscape-scale restoration.
2. Initiate programmes to control and/or eradicate Invasive alien species that threaten livelihoods and ecosystem functioning.

Monitoring Ecosystem Service Delivery

Existing Indicators for human and environmental wellbeing

There is a plethora of goals and targets towards which the conservation and sustainable development communities are working, not least of which are the Millennium Development Goals for 2015 and the 2010 target of the Convention on Biological Diversity. However, the dates of 2010 and 2015 are approaching fast. Our ability to chart our progress and adjust our course is limited by the lack of clear indicators that tell us how we are progressing towards our goals and meet a number of practical needs, namely:

- Be few in number;
- Be based on available data;
- Be linked to something we are concerned about;
- Be clear and unambiguous;
- Be policy-relevant (that is, implementable); and
- Be easy to communicate to the public and policy makers.

As livelihoods and the environment are closely linked, the ideal indicator framework would be one that addresses both objectives. One of the most complete assessments that address both issues was The Wellbeing of Nations (Prescott-Allen, 2001). However, an assessment of this magnitude is difficult to replicate on a regular basis and monitoring of progress towards the MDGs and 2010 targets will require regular updates of information in order to evaluate emerging trends and progress.

Of the multitudes of other available assessment and indicator systems available, a few of the most accepted ones that deal primarily with the issues of human development and environmental conservation include those listed in Table 1. Each of these has their strengths and weaknesses when considering the question of linking human livelihoods, the environment, and delivery of ecosystem services. These can be summarised in the table below.

While each of these systems has strengths and weaknesses, IUCN believes that a regular review of reports from a combination of these frameworks will provide much-needed input and feedback to both the conservation and development communities in monitoring progress towards achievement of the MDGs and the 2010 biodiversity target.

[Table 5] – A review of assessment and monitoring systems for sustainable development

	Strengths	Weaknesses
The Human development Index (UNDP)	<ul style="list-style-type: none"> • Widely quoted and accepted index measuring some sense of social well being • Strong links to social concerns, education and health • A clearly presented methodology based on widely available indicators. • Contains an explicit economic component 	<ul style="list-style-type: none"> • No explicit link to environmental resources or biodiversity
World Development Indicators (World Bank)	<ul style="list-style-type: none"> • Genuine Savings/ Adjusted Net Savings (ANS) explore the sources of net savings and the sustainable management of natural resources • Regularly published, there are strong links to policy making 	<ul style="list-style-type: none"> • ANS estimates do not include all natural resources (e.g. fisheries and freshwater are not included) • ANS estimates are only as dependable as the underlying data sets
The Environmental Sustainability Index (Yale)	<ul style="list-style-type: none"> • An innovative approach to environmental sustainability • Strong on both physical factors as well as institutional/ governance issues • Wide coverage • Good visual presentation (spider web) 	<ul style="list-style-type: none"> • A major effort, uncertain if this exercise can be repeated regularly • Also unsure if this is in use by countries to track their performance
Global Environment Outlook (UNEP and partners)	<ul style="list-style-type: none"> • A broad overview of changes in environmental issues, often presented at both global and regional levels • Broad coverage of major environmental/ resource management sectors 	<ul style="list-style-type: none"> • A descriptive approach, relying on available data • Weak on economic links
The Living Planet Report (WWF)	<ul style="list-style-type: none"> • Global coverage, • An interesting index relating to resource use per person and per country 	<ul style="list-style-type: none"> • Poor/ non-existent connections to human welfare and economic growth (or even improved environmental management)
The World Resources Report (WRI)	<ul style="list-style-type: none"> • Comprehensive coverage of resource issues • Analysis and synthesis provided • Extensive use of data sets and indicators 	<ul style="list-style-type: none"> • Based on a compilation of available sources and thereby limited by weaknesses of other sources

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