

Biodiversity and the Millennium Development Goals



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November 2003

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1. Introduction

The variety of life forms on earth, including genes, species and ecosystems, is known as biological diversity or biodiversity. Loss of biodiversity results in serious reductions in the goods (such as food, medicine and raw materials) and services (such as clean water and nutrient cycling) provided by the earth's ecosystems, which make human survival and economic prosperity possible (Anonymous 2002).

The Millennium Development Goals (MDGs) were formally established when the United Nations General Assembly adopted the Millennium Declaration in September 2000. Adoption of the Millennium Declaration paves a significant way to addressing issues of poverty eradication and sustainable development. Through a set of targets and dates, the MDGs provide a framework for measuring development progress. They also reinforce the commitment of the international community for a comprehensive and integrated approach to sustainable development.

Biodiversity plays an important role in ensuring that the targets of the MDGs for sustainable development are successfully achieved. However, the links between biodiversity and the path to achieving the MDGs have not been made explicit. The first section of this paper provides an introduction to the benefits of biodiversity and the Millennium Development Goals. The importance of biodiversity to development objectives is also discussed in the context of the WEHAB Initiative and the Convention on Biological Diversity. The second section of this paper provides a more detailed discussion of the role of biodiversity in achieving the targets of each of the MDGs. The third section considers links between climate change, biodiversity and the MDGs. Finally, section 4 provides the conclusions and recommendations for ways forward and future activities.

1.1 Biodiversity

Through the provision of biological resources and ecosystem services, biodiversity is an essential component of human development and human security. Through agriculture, forestry and fishing, biodiversity provides crops, timber and fish and contributes significantly to national economies and employment. Ecosystem goods range from food and water to timber and fodder to genetic resources. In addition, ecosystems provide essential services including nutrient cycling,

air and water purification, flood and drought mitigation and soil production, free of charge. These services can not be replaced at a reasonable price (WRI, 2002).

The direct economic benefits of biodiversity run into trillions of dollars per year (Costanza *et.al.* 1997). Some of the significant benefits include: an annual market value of crop production in the United States to tunes of about US\$40 billion which is completely dependent on insect pollinators; biological pest control that saves an annual revenue of US\$ 100-200 billion; and, biological nitrogen fixation has an estimated annual worth of US\$50 billion. While recognition of the values of the goods and services that biodiversity offers – both direct and indirect – is increasing, the relationship between the role of biodiversity in environmental sustainability, poverty reduction and sustainable development needs further attention and understanding.

1.2 The Millennium Development Goals

The Millennium Development Goals (MDGs) were formally established when the United Nations General Assembly adopted the Millennium Declaration in 2002. They address issues of poverty eradication and sustainable development through a set of targets and dates (Box 1). Achieving these targets is the responsibility of national governments.

One of the significant features of the MDGs is that they seem to focus on developmental issues, leaving options of how to implement actions to achieve the goals open for interpretation. Goal 7 of the MDGs focuses on ensuring environmental sustainability without any explicit mention of the role of biodiversity and natural resources. However, the role of biodiversity in ensuring that the targets of the MDGs are successfully achieved is well recognised. Attempts are being made to mainstream biodiversity into, not only MDG 7, but also across other MDGs, as achieving the targets of the MDGs will directly or indirectly impinge on the status and use of biodiversity.



Box 1 – The Millennium Development Goals and Targets

Goal 1 - Eradicate Extreme Poverty and Hunger

Targets: Halve, between 1990 and 2015, the proportion of people whose income is less than \$1 a day; Halve, between 1990 and 2015, the proportion of people who suffer from hunger.

Goal 2 - Achieve Universal Primary Education

Target: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling.

Goal 3 - Promote Gender Equality and Empower Women

Target: Eliminate gender disparity in primary and secondary education preferably by 2005 and in all levels of education no later than 2015.

Goal 4 - Reduce Child Mortality

Target: Reduce, by two-thirds, between 1990 and 2015, the under-five mortality rate.

Goal 5 - Improve Maternal Health

Target: Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio.

Goal 6 - Combat HIV/AIDS, Malaria and other Diseases

Targets: Have halted by 2015 and begun to reverse the spread of HIV/AIDS; Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases.

Goal 7 - Ensure Environmental Sustainability

Targets: Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources; Halve, by 2015, the proportion of people without sustainable access to safe drinking water; Have achieved, by 2020, a significant improvement in the lives of at least 100 million slum dwellers.

Goal 8 - Develop a Global Partnership for Development

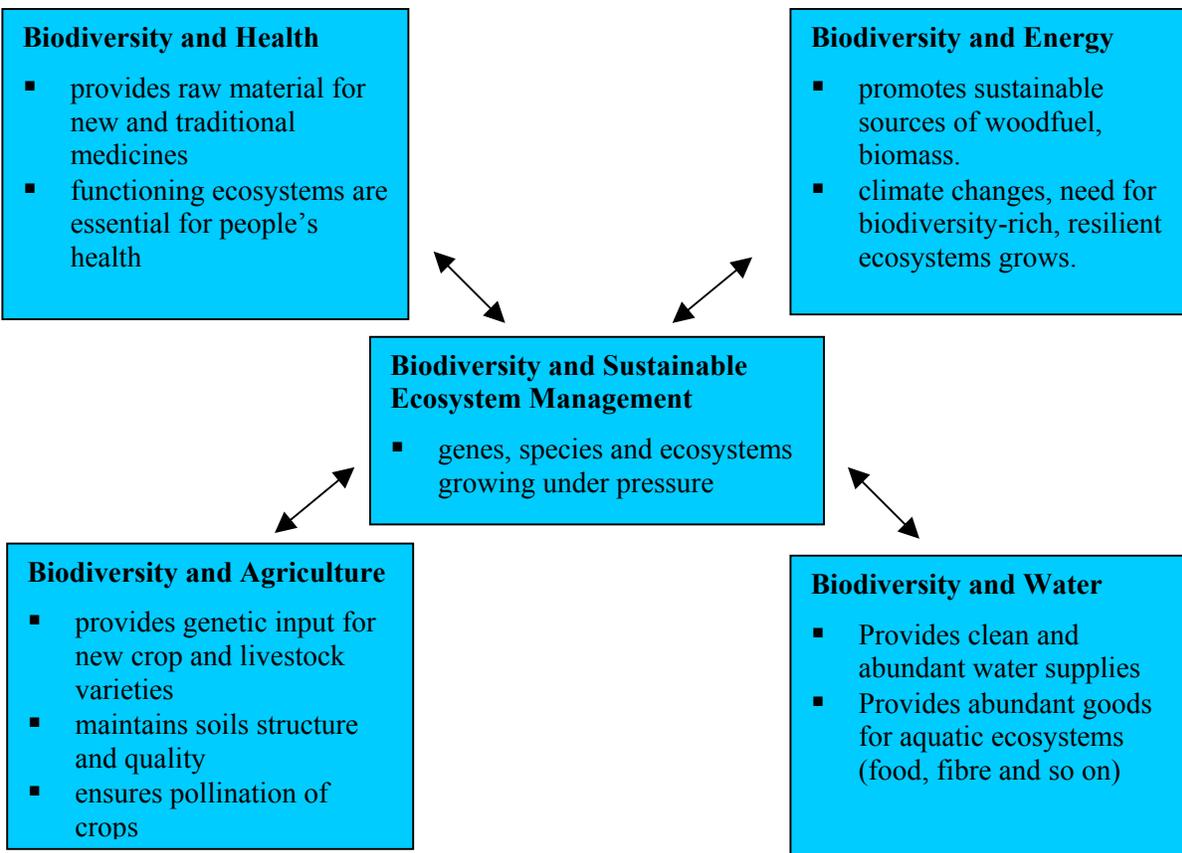
Targets: Develop further an open, rule-based, predictable, nondiscriminatory trading and financial system (includes a commitment to good governance, development and poverty reduction - both nationally and internationally); Address the special needs of the least developed countries (including tariff- and quota-free access for exports, enhanced program of debt relief for and cancellation of official bilateral debt, and more generous ODA for countries committed to poverty reduction; Address the special needs of landlocked countries and small island developing states (through the Program of Action for the Sustainable Development of Small Island Developing States and 22nd General Assembly provisions; Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term; In cooperation with developing countries, develop and implement strategies for decent and productive work for youth; In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries; In cooperation with the private sector, make available the benefits of new technologies, especially information and communications technologies.

1.3 WEHAB Framework

In September 2002 - thirty years after the Stockholm Summit and ten years after the Earth Summit - world leaders, scientists, policy makers and communities met in Johannesburg to assess the achievements towards attaining sustainable development through interventions including sound environmental management. The World Summit on Sustainable Development (WSSD) provided the needed platform to fine tune issues, identify newer partnerships and suggest guiding principles to achieve sustainable development. A significant element of the outcomes of WSSD is the framework of action suggested under the WEHAB initiative. This initiative, under the guidance of the UN General Assembly, focuses on issues of Water, Energy, Health, Agriculture and Biodiversity. The critical role of biodiversity and sustainable ecosystem management in WEHAB priority areas is exemplified through Figure 1. Under this, biodiversity is considered as the *“life insurance policy for life itself”* (McNeill and Shei 2002).

Figure 1 – Examples of the Critical Role of Biodiversity and Sustainable Ecosystem Management under WEHAB Priority Areas

(Source: McNeill and Shei 2002)



1.4 Convention on Biological Diversity

One of the landmark outcomes of the 1992 Earth Summit was the adoption of the Convention on Biological Diversity (CBD), which has so far been ratified by 189 countries. The CBD focuses on conservation of biodiversity, sustainable use, and fair and equitable sharing of benefits arising out of the use of biodiversity. The CBD is one of the most important international conventions and is implemented widely and in many cases effectively.

Discussions through the CBD Conference of Parties set an international agenda to reduce the rate of loss of biodiversity by 2010. The so-called “2010 targets” are currently under discussion and indicators, measures and options are being identified. A significant element of CBD is the underpinning it provides for sustainable development through biodiversity conservation. It is thus imperative to link CBD both to MDGs and WEHAB principles. The following Table 1 provides linkages between biodiversity and livelihoods (Koziell 2001), which exemplifies the need for an integrated approach for biodiversity conservation and sustainable livelihood development.

Table 1 – Livelihood and biodiversity change scenarios

(Source: Koziell 2001)

	Livelihood Improvement	Livelihood Decline
Biodiversity maintained or increased	1. Poor and indigenous communities (with marginal agricultural potential) will maintain and enhance biodiversity – either because they have no purchasing power to obtain commercial products and therefore no alternative support for their livelihoods, or because they choose to, for cultural or religious reasons.	2. Exclusionary PAs that yields conservation benefits for the international community, but at a cost to local communities whose access to resources is restricted.
Biodiversity loss	3. Land is converted to industrial agricultural plantations of high-yielding varieties for domestic and export markets. Efficiency gains from economies of scale can reduce product prices, benefiting the urban poor, who spend up to 80 per cent of their income on food.	4. Intensive and large-scale extraction of resources such as timber by distant companies can lead to losses of other biological resources, such as NTFPs, which may be critical sources of income or subsistence food for small-holder agriculturalists.

A DFID, IUCN and EC study on identifying the role of biodiversity in development identified the following 7 principles as the guiding principles for biodiversity in development cooperation (Box 2). The key underlying understanding is the fact that biodiversity is not just a measure of sustainable development or a concern of environmentalists, it is essential for many people's lives.

Box 2 – Guiding Principles for Biodiversity in Development Cooperation

(Source: DFID, IUCN and EC 2001)

Principle A: Adopt an ecosystem and multi-sectoral approach to development cooperation programmes (taking into account the impacts on adjacent and downstream areas).

Principle B: Promote fair and equitable sharing of costs and benefits from biodiversity conservation and sustainable use at and between local, national, regional and international levels.

Principle C: Encourage full stakeholder participation, including partnerships between civil society, government and private sector.

Principle D: Ensure that the institutional arrangements are effective, transparent, accountable, inclusive and responsive.

Principle E: Ensure that development cooperation projects and programmes are consistent with the wider policy framework, and/or changes are made for supportive policies and laws.

Principle F: Use/provide accurate, appropriate, multi-disciplinary information, which is both accessible to and understood by all stakeholders.

Principle G: Development cooperation investments must be sensitive to, and complement, local/national structure, processes and capacities.



2. Some Specific issues and operational options to link CBD Targets and achieving the Millennium Development Goals (MDGs)

After the adoption of MDGs by the UN General Assembly in September 2000, various fora acknowledged the important relationship between biodiversity and the MDGs. In April 2002, the 6th Conference of Parties to the Convention on Biological Diversity, recognizing that biodiversity underpins sustainable development, established 2010 as the target year for halting biodiversity loss. In May 2002, UN Secretary General set out the five WEHAB priorities for the World Summit on Sustainable Development (WSSD). The WSSD Plan of Implementation called for actions from all sectors to significantly address reducing the rate of loss of biodiversity.

Considering the importance of addressing issues of mainstreaming biodiversity into MDGs, IUCN Regional Biodiversity Programme, Asia in collaboration with UNDP and Government of India, organized an Asia Regional Workshop on the issue in India between 6-11 April 2003. The recommendations from the workshop form the basis for this section and the recommendations are detailed as specific activities under each of the MDG as they relate to issues of biodiversity. In addition, UNDP, UNEP-WCMC and others organized an international workshop on addressing the issues of biodiversity in relation to MDGs and WEHAB (The 'Biodiversity after Johannesburg' meeting in London), outcomes of which also encourage the need to address synergies between MEAs, mainstreaming biodiversity into MDGs as options to achieving sustainable development.

2.1 Goal on Poverty and Role of Biodiversity

Goal 1 - Eradicate Extreme Poverty and Hunger

Targets: Halve, between 1990 and 2015, the proportion of people whose income is less than \$1 a day; Halve, between 1990 and 2015, the proportion of people who suffer from hunger.

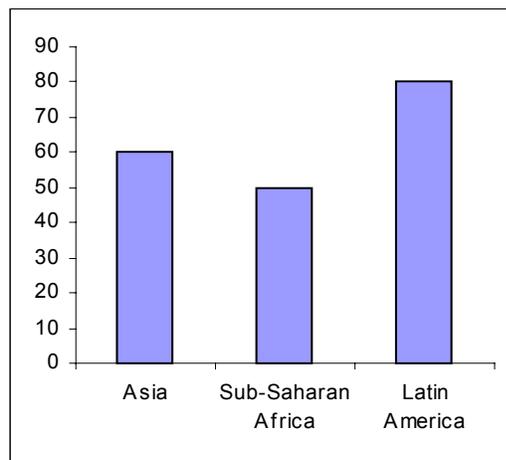
The Millennium Development Goals reflect the multifaceted nature of poverty, with each goal illustrating a different aspect of poverty. The MDGs are an attempt to operationalise the multidimensional approach to poverty, focusing on selected indicators. Since biodiversity impacts issues of poverty, a focus on using biodiversity equitably and sustainably is fundamental to strategies and actions to eradicate/reduce poverty and to achieve sustainable development.

Links between Biodiversity and Poverty

The poverty goal of the MDGs addresses issues of extreme poverty, hunger and malnutrition, which are closely related to the livelihoods and vulnerability of households. Rural households derive a significant proportion of their food and income from biological resources and, therefore, the availability and sustainability of biological resources is of direct relevance to poverty reduction for these people. Additionally, a large proportion of poor people live in marginal environments and in areas with low agricultural productivity or in fragile lands (see Figure 2 below).

Figure 2 - Percentage of the poorest living on fragile land

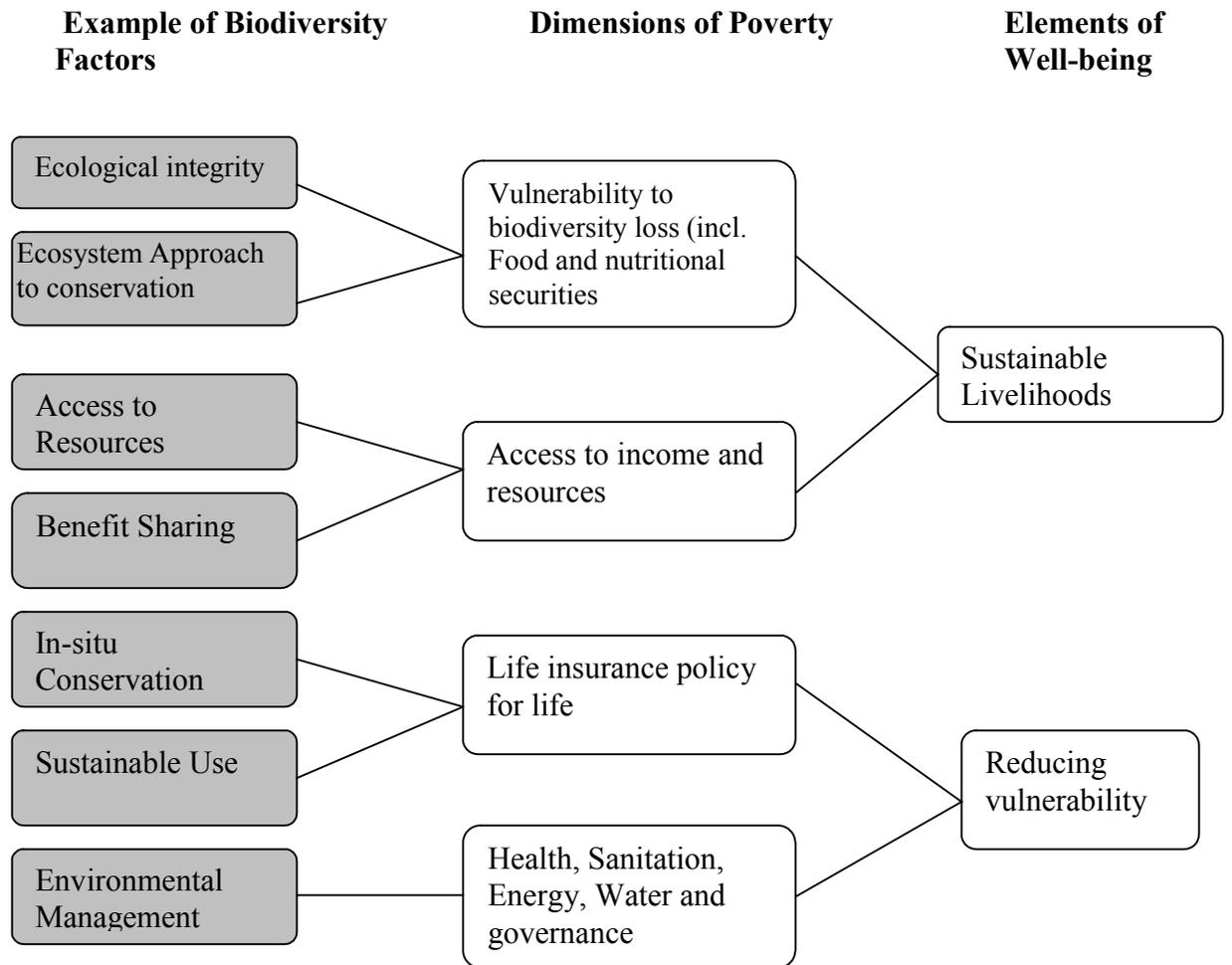
(Source: World Bank 2002)



In these environments, there is a high dependency on genetic, species and ecosystem diversity to support their livelihoods. That is, aspects of biodiversity are of direct and indirect importance to food availability, health, nutrition, house-hold development, income generation and vulnerability. Furthermore, improvements to core productive assets (including biodiversity-related factors of soils, water, trees and natural vegetation) is identified by the Millennium Project Task Force 2 on Hunger as the first step of the principle strategy for reducing undernutrition in households in such high-risk environments (Scherr 2003).

The following Figure 3 illustrates links between biodiversity and poverty and Box 3 provides a discussion of relationship between poverty and the environment.

Figure 3 – Biodiversity Links to the Dimensions of Poverty



Box 3 – An improved understanding of poverty-environment relationships

(Source: DFID, EC, UNDP and The World Bank 2002)

- **Most environmental degradation is caused by the non-poor:**

Most environmental degradation is caused by the non-poor as a result of their production and consumption levels, which are much higher than those of the poor, particularly in the highly industrialized countries. Even where poor people degrade the environment, this is often due to the poor being denied their rights to natural resources by wealthier elites and, in many cases, being pushed onto marginal lands more prone to degradation.

- **Population growth does not necessarily lead to increased degradation:**

While increasing population undoubtedly places greater pressure on productive land and resources, it is not necessarily population per se that causes the damage. The complex of locally specific social, economic, environmental and governance circumstances in which population increases take place – which in turn can be strongly influenced either positively or negatively by external economic and political forces – are the primary driving forces behind poverty-environment interactions. Indeed, conventional economic theory would suggest that as population increases and land becomes scarcer, the land should increase in value and merit greater care and investment. Research in Kenya has documented cases where, even in the face of increasing population pressures, farmers have managed semiarid, degraded, unproductive lands in a manner that has rehabilitated them and made them profitable (Tiffen, Mortimore and Gichuki, 1994). A wider review shows that for population growth to lead to improved soil and water investments, market access and attractive producer prices are essential, as well as social and economic support to prevent the collapse of social structures (Boyd and Slaymaker, 2000). In many areas, these conditions will not be present, and population growth will increase pressure on the environment.

- **The poor are capable of investing in environmental improvement:**

The conventional wisdom has been that poor people are too impoverished to mobilize resources for enhancing the environment. In some cases this is true. But numerous experiences demonstrate that when incentives are favorable, low-income households and social groups can mobilize enormous resources, particularly labor. There are many well-documented cases of poor people investing their own time and resources in environmental management, and succeeding in maintaining production and profitability while keeping their families and communities from the worst effects of poverty. For example, many urban environmental problems can most effectively be solved when poor communities mobilize themselves or form coalitions with less-poor groups to improve service provision, often with some contribution in cash or kind (Hardoy, Mitlin and Satterthwaite, 2001).

- **Poor people often have the technical knowledge for resource management:**

It is often assumed that a lack of technical knowledge is a key constraint to poor people's management of natural resources. Indeed, when poor people move to areas with new ecological conditions, or when something happens to change the balance under which their resource management practices developed, a period of adjustment is required. Evidence is increasingly showing that poor people have an enormous store of indigenous technical knowledge – for example, environmentally sound cultivation practices, efficient water harvesting techniques, and myriad uses for medicinal plants. This knowledge is often undervalued or completely ignored.

The World Bank and IMF review of Poverty Reduction Strategy Paper (PRSP) suggested that the national PRSP can guide the implementation of MDGs even though the indicators used are different. However, none of the PRSPs developed so far address the issue and importance of biodiversity as a critical element of poverty reduction at national level nor the impacts of biodiversity in livelihood securities.

Links to CBD

Integration of MDG 1 into the 2010 targets of the CBD will also help to ensure the targets of MDG 1 are met while, at the same time, ensuring the sustainable use of biodiversity. Broadly, the following may be considered as ways to integrate issues of MDG 1 and CBD targets of 2010:

- Improving poor peoples' access to, and tenure of, biodiversity resources;
- Involving the poor in decision and policy making;
- Providing market linkages and sustainable use practices;
- Investing in research and development on how to improve rural incomes; and
- Developing mechanisms to continue or enhance public interest in biodiversity – maintaining products and services.

Outputs from Asia Regional Workshop

Some of the more specific actions and interventions to achieve MDG 1, while ensuring the sustainable use of biodiversity include:

- Improve the Human Resources Capital through revision of education policies, training and capacity building that encourages income generation.
- Achieve population control targets by raising awareness, empowerment, education and equity through development and implementation of appropriate policies - thus reducing the pressure on biodiversity.
- Develop income generation opportunities through sustainable livelihoods using Public – Private Sector partnerships with supporting policies and investments at local levels.

- Achieve minimum nutritional standards of people by: promoting cultivation of nutritional crops, drought resistant varieties; setting up community seed banks; provision of access to nutritional food; raising awareness on removing hidden and transient hunger.
- Promote access and benefit sharing activities (ie. benefits of conservation efforts should be targeted to the poor (stakeholders) by: supporting activities on ex-situ cultivation; developing policies/legislations on sharing of benefits including the mechanisms for enforcement; and raising awareness.
- Promote sustainable use practices and market linkages by developing policies and regulations through cooperatives and other appropriate mechanisms.
- Understand the economic values of biodiversity and empower local communities on achieving economic gains (within the legal ambit) by developing suitable market linkages and strategies.
- Raise the awareness of communities on values of biodiversity by: assessing the economic value of biodiversity; raising awareness; building capacities of communities; identifying and supporting elements of biodiversity that impact livelihoods.
- Promote sustainable agricultural practices by: providing incentives to farmers for following sustainable practices; supporting use of modern and traditional technology blends; supporting effective Public Distribution System.

2.2 Gender and Education: Links to Biodiversity

Goal 2 - Achieve Universal Primary Education

Target: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling

Goal 3 - Promote Gender Equality and Empower Women

Target: Eliminate gender disparity in primary and secondary education preferably by 2005 and in all levels of education no later than 2015

The second and third MDGs refer to education and gender. While the education goal is sector specific, gender is a cross-cutting issue. The biodiversity links to these goals are more tenuous than for the other goals.

Attaining the goals of education and gender is possible only when we remove barriers to girls' education and schooling. Beyond this the MDGs recognise that promoting gender equality and empowering women are effective ways to combat hunger, nutrition and household insecurities.

Biodiversity directly affects access to education and women's empowerment by impacting on the time taken for women to perform certain household duties, and thus the time available for education and other activities. Degradation of biological resources and subsequent non-availability of fuel, non-timber forest produce (NTFPs) and potable water can result in significant time being spent collecting these resources everyday. Experiences from Burkina Faso, Uganda and Zambia provide us figures showing that women and girls can save hundreds of hours a year if walking time to sources of fuels and potable water were reduced to 30 minutes or less.

Box 4 – Burden of Water Collection on Women and Children

(Source: IIED 2002)

A recent water use study in Kenya, Uganda and Tanzania went back to the same 34 sites that were studied in 1972. Water is still primarily collected by women and children and carried on the head, leading to headaches, general fatigue and pains in the chest, neck and waist. The distance walked to collect water was about 580m in rural areas (although for some it can reach over 4km) and 300m in urban areas. This is a slight improvement since 1972 due to more standpipes, wells and private vendors including in rural areas. A return journey to collect water takes about 25 minutes (double the time since 1972) and 3.9 trips per day are made by each household. Thus, an average household spends 1 hour and 40 minutes each day collecting water. This reduces time for cooking and can affect the amount of time children spend at school.

The above example (Box 4) provides guidance for necessary policy and conservation interventions to see that conservation of water resources and associated biodiversity can substantially reduce the burden on women and girl child to focus attention on education and livelihood improvement activities as well as providing some sources of income through NTFP production and natural resource management, including growing of fodder or fuel wood resources.

This burden of disease is adding to the burdens of poverty for women and children. The physical stress of long journeys to collect fuel and water, can impact on the health of both women and girls. Additionally, children and women in central Kenya and India are disproportionately affected by

acute respiratory infections, caused by prolonged exposure to indoor air pollution from the combustion of biomass.

Links to CBD

The CBD also recognises the role of education and gender. Article 13 of the CBD deals with issues of education while gender is seen as a cross-cutting underlay for all conservation, use and benefit sharing activities. Therefore, gender does not find any explicit mention in CBD. However, links to these MDGs (Goals 2 and 3) and CBD are very imminent.

Outputs from Asia Regional Workshop

Some of the more specific actions and interventions to achieve this MDG include:

Goal 2

- Integrate conservation and sustainable use into education programmes (formal and non-formal) through the provision of education opportunities that particularly target the communities that are poor and those dependant on natural resources (eg. those living in Protected Areas).
- Provide incentives for primary education by developing appropriate primary education policies that are relevant to local needs.
- Promote policies aiming at compulsory primary education by developing methods to target local communities (like residential schools in rural areas – PAs).
- Mainstream achieving primary education targets by encouraging primary education in rural and urban areas through: policies and interventions; identifying mechanisms to link primary education and rural development; developing mechanisms of incentives like ‘free education’, ‘food for education’.

Goal 3

- Develop policies to promote incentives and create an enabling environment, which provides better opportunities for girls to education and removes gender disparities by: providing incentives to encourage girl child education; developing guidelines that address the importance of gender roles and responsibilities in biodiversity conservation

2.3 Health Goals and Biodiversity

Goal 4 - Reduce Child Mortality

Target: Reduce, by two-thirds, between 1990 and 2015, the under-five mortality rate

Goal 5 - Improve Maternal Health

Target: Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio

Goal 6 - Combat HIV/AIDS, Malaria and other Diseases

Targets: Have halted by 2015 and begun to reverse the spread of HIV/AIDS; Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases.

Biodiversity provides one of the significant contributions to achieving MDGs 4, 5 and 6. Recent studies led by Harvard Medical School reveal that biodiversity plays a crucial role not only in providing medicines to deal with issues of health and nutrition, but ecosystems play a significant role in dealing with diseases like malaria and others (Chivian 2002).

The commission on the nutrition challenges of the 21st century, in its report titled “Ending malnutrition by 2002: An agenda for change in the millennium”, has pointed out that some 30 million infants are born each year in developing countries with intra-uterine growth retardation (IUGR). This represents about 24% of all new births in these countries (Philip 2000). IUGR has been associated with maternal nutritional depletion and low birth weight children are characterised by mental impairments. The MDGs recognise these issues and aim to address issues of reducing mortality rates of both new-borns as well as the maternal mortality. The following Box 5 outlines strategies implemented under Thailand’s Nutritional Security Pact and its influence on the reducing maternal mortality and the incidence of low birth weight children.



Box 5 – Thailand’s Nutrition Security Compact

(Source: Swaminathan M.S. 2001)

During the past 10 years, Thailand has achieved remarkable progress in reducing maternal mortality as well as the incidence of Low Birth Weight (LBW) children. The strategy consisted of the following components:

- Eliminate severe, moderate and mild protein-energy malnutrition (PEM)
- Monitor growth among all pre-school children and provide food supplements where needed
- Mainstream nutrition in health, education and agricultural policies
- Retrain and retool existing staff and mobilise community volunteers. Choose one community volunteer for every 10 households and build their capacity
- Encourage breast feeding and organise school lunch programmes
- Promote home gardening, consumption of fruits and vegetables, aquaculture and food safety standards
- Introduce an integrated food safety net with emphasis on household food and nutrition security.

The positive impact of the above Nutrition Security Compact is evident from the decline of maternal mortality from 230 per 100,000 live births in 1992 to 17 in 1996 (Philip 2000). Thailand’s initiative in organising a Community Volunteer Corps for Household Nutrition Security is worth or emulation by other nations.

The World Health Organisation estimates that 80% of the world’s population from developing countries relies mainly on traditional medicines for primary health care. Of the 119 chemical compounds derived from 90 plant species, 74% of these are used as drugs. The following Box 6 provides some information on the economic value of biodiversity to pharmaceuticals.

Box 6 – Examples of Values of Natural Products as Pharmaceuticals

(Source: Chivian. E (Ed.) 2002)

A question that is often asked is whether there is any data on the financial value of natural product-derived drugs for pharmaceutical companies. A recent analysis by Newman and Laird (1999) demonstrated that the percentage of sales (not profits) derived from natural products or related compounds ranged from 50% for Merck to 8% for Johnson and Johnson, with the majority of companies falling between 15 and 30 percent. Companies were not included unless they had at least one drug that sold for more than US \$1 billion. It should be emphasized that this was a one-time study using only 1997 sales figures for drugs that sold more than US \$1 billion that year, and that almost all of the natural product-derived drugs in this analysis were microbial in origin. It was not for another two years that the first plant-derived drug to break sales figures of US \$1 billion arrived, and that was Taxol.

Environmental impacts leading to incidences of diseases like malaria and others are also recognised through MDGs. Box 7 below provides an example of the relationships between ecosystem disturbance and infectious disease.

Box 7 – Diversity of vectors and pathogens

(Source: E. Chivian. (Ed.) 2002)

The major vector-borne pathogens and the diseases caused by them are concentrated in the tropics, with the majority of important vectors of human and animal diseases being found in the rich biodiverse tropical rain forest ecosystems, woodland savannas, and the edges of these ecosystems. The major insect vector groups – *Anopheles*, *Aedes*, *Culex*, and *Mansonia* mosquitoes; *Simulium* blackflies, the new world vectors of *Leishmania* (*Lutzomyia*); the *Chrysops* vector of *Loa loa*; and the *Glossina* species which transmit trypanosomes – all contain species which are dependent on forest, woodland savanna, or riverine forest ecosystems. It is the degradation of these ecosystems; the behavior and ecology of the vectors at the forest edges; and the impact of reforestation on the interactions between humans, vectors, and reservoir hosts at the boundaries between habitat types (ecotones) that determine the epidemiology of human infectious diseases. Additional factors are the degree of immunity of local or migrant populations; their nutritional status and their behavior; the interaction with, and behavior of reservoir hosts; and the availability and effectiveness of surveillance systems and healthcare.

Links to CBD

Under the CBD there is no specific Article that deals with issues of health or reducing mortality rates. However, the general principle of conservation and sustainable use of biological diversity is the focus for national action on using biodiversity to reduce the impacts of poor health on humans and ecosystems. Issues of ecosystem disturbance and related health impacts are receiving much attention.

Outputs from Asia Regional Workshop

Some of the more specific actions and interventions to achieve this MDG include:

Goal 4

- Strengthen primary health care and nutrition through the use of traditional knowledge and traditional medicine by identifying and encouraging the use of medicinal plants and crop

plants to achieve house-hold and primary health care *eg* by documenting medicinal plants and use of a community (participatory) biodiversity register.

- Promote conservation of biodiversity through ecosystem approach for watershed management in order to ensure adequate water supply, in terms of quality and quantity, for households by developing appropriate management plans for watersheds and their use.
- Mitigate negative impacts of agricultural and forestry practices that affect child growth by developing suitable management methodologies for addressing issues of ecosystem imbalance and increases in incidence of diseases (eg. clearing of forests and vector borne disease).

Goal 5

- Provide alternate sources of energy for house - hold purposes for women by developing policies and mechanisms to replace existing methods of cooking and related activities.
- Promote forestry activities with a focus on sustainable harvesting and management of fuel wood and Non-Timber Forest Products by supporting activities such as Joint Forest Management and development of Community Wood lots etc. (creating equitable access among gender, class and caste to forest resources).
- Promote innovative methods for using biodiversity as medicines by increasing support to research and development and raising awareness on medicinal plants and their usage.
- Promote agronomic practices that can provide better house-hold nutrition by encouraging development of home gardens, Medicinal Plant Conservation Areas, Mixed cropping etc.

Goal 6

- Support ethnobotanical studies on role of plants/microbes in treating diseases by enhancing research and development and promoting the use of traditional medicine in treatment of such ailments.
- Promote option of using biological control agents by supporting research and development.
- Promote integrity of ecosystems by supporting initiatives such as land-use, capacity building, sharing of experiences.

- Promote management of water resources and bodies to achieve reduction in incidence of diseases by identifying and supporting appropriate management strategies.

2.4 Environmental Sustainability and Biodiversity

Goal 7 - Ensure Environmental Sustainability

Targets: Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources; Halve, by 2015, the proportion of people without sustainable access to safe drinking water; Have achieved, by 2020, a significant improvement in the lives of at least 100 million slum dwellers.

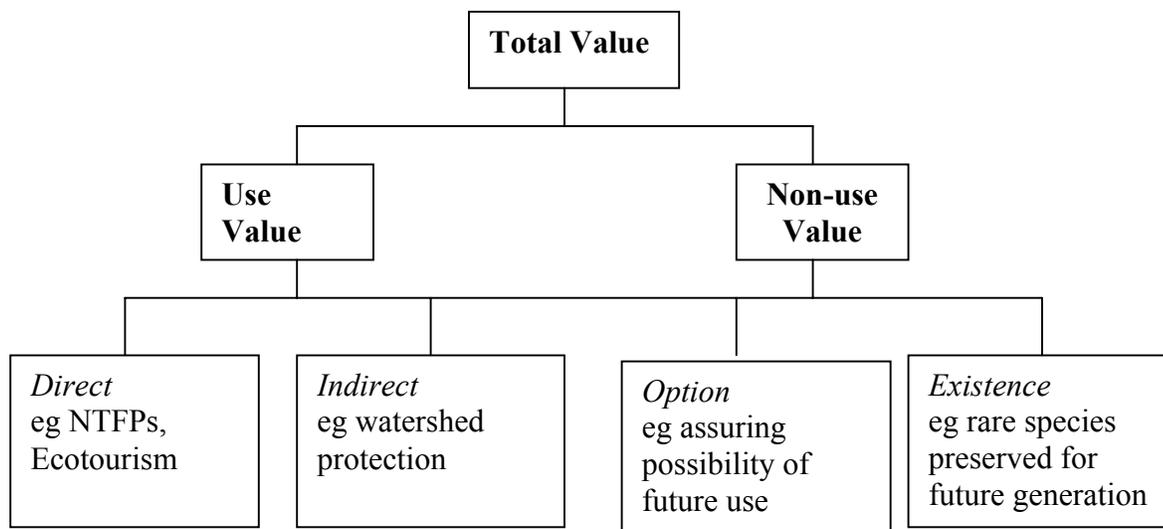
Current estimates are that approximately 1 billion people are affected by soil erosion and land degradation due to deforestation, overgrazing and agriculture. Water scarcity is a major issue in more than 20 developing countries. Over 2 billion people continue to rely on biomass fuels and traditional technologies for cooking and heating and up to 2 billion people have no access to electricity (UNDP, UNDESA and World Energy Council 2000). Shortage of wood fuel imposes time and financial costs on poor households, putting a particular burden on those that are short of labor and making it harder for children to attend school.

Poor people are affected by natural resource degradation and biodiversity loss much more than the better off because of their limited assets and access. For example, in a study in West Africa, children showing growth abnormalities associated with poor nutrition (stunting) were found most frequently in areas of high soil degradation (GRID/Arendal 1997).

To understand the importance of biodiversity for human development, we need to evaluate the products that can be used and the economic system services that support human development. An accurate valuation of biodiversity needs to consider the direct use values (products) and indirect use values (services) and combine consumptive and non-consumptive use. The following Figure 4 explains some linkages.

Figure 4 – Economic value of biodiversity

(Source: DFID, IUCN and EU 2000)



Apart from the direct use values, biodiversity found in ecosystems provide enormous economic gains. The following Table 2 illustrates some of these:

Table 2 – Ecosystem Services and Functions

(Source: Constanza *et al.* 1997)

Ecosystem Service	Estimated Economic Value (global, US\$ ha/year)		
	Wetland	Forest	Rangeland
<i>Climate regulation</i>		141	0
<i>Disturbance regulation</i>	4539	2	
<i>Water regulation</i>	15	2	3
<i>Water supply</i>	3800	2	
<i>Soil formation</i>		10	1
<i>Erosion control</i>		96	25
<i>Nutrient cycling</i>		361	
<i>Waste treatment</i>	4177	87	87
<i>Pollination</i>			25
<i>Biological Control</i>		2	23

The underlying causes of biodiversity loss are very similar to the underlying causes of poverty and include centralized planning, constraints on access and ownership, unregulated markets, weak political voice etc. The challenge for development here is to ensure that:

- biodiversity and the environment continue to provide goods and services needed for human development
- costs and benefits from the use of such goods and services are sustainably and equitably shared
- policies influencing sustainability are developed based on participatory approaches
- the scientific and technological impacts on services provided by biodiversity be assessed and solutions for ecosystem friendly alternative and efficiencies be found

Improving environmental management to reduce poverty requires local understanding of how environmental conditions relate to poverty, and the ability to identify and set priorities on alternative policy options and evaluate their effectiveness and impact. Environmental data tend to focus on environmental change without determining poverty effects, while poverty monitoring systems often ignore environmental concerns. Indicators are therefore needed to measure health and vulnerability of the poor and these need to be integrated into national poverty monitoring systems and assessment.

Unfortunately, the Poverty Reduction Strategy Papers (PRSPs) fail to consider such issues and linkages. Greening PRSPs is thus the need of the hour. The “poverty-environment maps” available in few countries can be a good beginning point for such activities (Henninger and Hammond 2000).

Outputs from Asian Regional Workshop

The following specific actions may be considered to for mainstreaming issues of biodiversity in achieving MDG 7, in addition to those explained above:

- Integrate national action plans dealing with Convention on Biological Diversity, UN Framework Convention on Climate Change (UNFCCC) and the Convention to Combat Desertification (CCD) and their implementation

- Identify monitoring mechanisms to achieve reduction of biodiversity loss (2010 targets) [Using indicators like threatened species]
- Promote ecosystem approach to conservation
- Integrate biodiversity concerns into environmental impact assessments, strategic environmental assessments and others
- Implement afforestation and reforestation programmes
- Promote appropriate land use policies
- Address issues of risk assessment and risk management with regard to genetically modified organisms and Invasive Alien Species
- Creation and management of National Biodiversity Conservation Areas, Protected Areas and other areas of biodiversity hot spots and suggest appropriate actions to promote environmental sustainability
- Link ecological sustainability with sustainable development (economic, social and environmental well-being)

Achieve environmental sustainability through Clean Development Mechanisms (CDM), buffer zone management, eco-development plans and Joint Forest Management (JFM)

Conjunctive use of water (surface and ground) for environmental sustainability

- Support policies and plans for management of effluents to ensure environmental sustainability
- Identify policies and interventions, where appropriate, to reduce out migration from rural areas by provision of employment opportunities

2.5 Developing a Global Partnership and Biodiversity

Goal 8 - Develop a Global Partnership for Development

Targets: Develop further an open, rule-based, predictable, nondiscriminatory trading and financial system (includes a commitment to good governance, development and poverty reduction - both nationally and internationally); Address the special needs of the least developed countries (including tariff- and quota-free access for exports, enhanced program of debt relief for and cancellation of official bilateral debt, and more generous ODA for countries committed to poverty reduction; Address the special needs of landlocked countries and small island developing

states (through the Program of Action for the Sustainable Development of Small Island Developing States and 22nd General Assembly provisions; Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term; In cooperation with developing countries, develop and implement strategies for decent and productive work for youth; In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries; In cooperation with the private sector, make available the benefits of new technologies, especially information and communications technologies.

Goal 8 of the MDGs focuses on means of achieving the first seven goals. In the spirit of this goal, developed and developing countries need to work in partnership to address sustainability issues.

The 1992 Earth Summit clearly established the objective of sustainable development. Ten years later this objective remains the goal of world community as stated through the Millennium Declaration and the MDGs. In addition, the Monterrey Summit on “Financing for Development” witnessed renewed commitments from developed countries to work towards meeting the ambitious targets for development. Achieving development goals requires considerable resources and creative use of both existing and new resources. Generating public resources and attracting private resources to finance development and conservation are thus needed.

Preliminary estimates by the World Bank are that it will take an increase in foreign aid of up to US\$ 40 to 60 billion per year to reach the MDGs (Devarajan *et al.*, 2002). Increasing the quantity and effective delivery as well as use of aid is essential to ensure the poorest countries have resources to finance the investments required to reach critical thresholds in infrastructure, education and health. To ensure the effectiveness of the aid, developing countries need to improve economic and democratic governance and implement policies for effective poverty reduction. An example of inefficiencies and mismanagement, with drastic implications for development goals, is provided in Box 8. These issues must be overcome.

Box 8 - Financial impact of energy mispricing in India

(Source: IMF, UNEP and The World Bank 2002)

Power subsidies are imposing a growing and unsustainable financial burden in India. In 1992-93, total financial losses in the power sector came to US\$1.7 billion. By 2001, low tariffs (which encourage high and wasteful use), high technical losses, and widespread non-payment, combined to increase state utility losses to more than US\$5 billion per year. If current trends continue, state utility financial losses will reach US\$10 billion per year in another three years. To put this magnitude of losses into perspective, US\$5 billion is half of what all the state governments in India combined are spending on all levels of education every year. It is double what they are collectively spending on health, and three times what they are spending on water supply. If power sector financial losses were reduced by only one third, the savings in a single year would be sufficient to fill every teacher vacancy in the country and provide every school with running water and toilet facilities.

In addition to the increases in the Official Development Assistance, as promised at Monterrey, countries need to identify their own internal resources and move forward to forging new and better partnerships to mobilize more financial resources. Type 2 partnerships that bring about enhanced linkages between public and private sector; private sector and NGO; south – south cooperation as discussed at WSSD might be a way forward in addition to finding public-private partnerships.

Debt relief can also help to release resources that could finance additional spending in areas that contribute to attaining the targets of the MDGs. That is, increased debt relief for developing countries will assist in creating an enabling environment for sustainable development. In addition, innovative ways for industrialized countries to provide assistance while promoting conservation should also be further explored. For example, debt for nature swaps can be an effective way of maintaining or promoting sustainable management of natural resources in developing countries in exchange for debt relief.

There is enormous scope for change to discriminatory trade policies in rich countries that limit market access for developing countries and distort global markets. It is recognised that greater market access for developing countries, coupled with development assistance, would significantly contribute to the likelihood of many countries achieving the MDGs by 2015 (Devarajan *et al.*, 2002). However, recent statistics indicate that current trade liberalisation rules and policies have

lead to increases in poverty and inequality, with a disproportionately large negative impact on developing countries (World Trade Organization, 2003). Concerns regarding the current and emerging asymmetries in the world trading system should be addressed to ensure that the system evolves in such a way that it is responsive to the development needs of its members and that a more level playing field is created (RIS, 2003).

Technology transfer and benefit sharing are also key issues that affect people in developing countries and their path towards sustainable development. Technological innovations can increase productivity resulting in increased household incomes and provide solutions to many development problems such as disease, transport, energy, water supply and sanitation (UNEP, IISD, 2000; UNDP, 2003). It is vital that developed countries share technological progress with developing countries and invest more into technology development that addresses issues of poverty reduction. Recognition of indigenous knowledge, including knowledge about genetic material and technology, and benefit sharing for access to and use of this knowledge is also vital for meeting conservation and development goals as well as meeting the provisions of the CBD for the fair and equitable sharing of the benefits arising out of the use of genetic resources. These issues are summarised in the following extract from Walker (2001) (Box 9).

One of the targets mentioned in this MDG deal with accessibility of drugs for poor and the needed reforms to ensure such access is sustainable. The example provided in Box 10 from Thailand provides a good pointer in this direction for future and further actions.



Box 9 The TRIPS Agreement and Sustainable Development: Role of Biodiversity and the CBD

(Source: Walker 2001)

- As the shift to a 'knowledge economy' continues, the definition of ownership and control of information becomes one of the most important policy issues facing societies. The leading international legal framework for determining rights over information is the World Trade Organization's (WTO) Agreement on Trade-Related Aspects of Intellectual Property Rights (the TRIPS Agreement).
- This shift in the balance between public and private interests takes on a new dimension when viewed in the international context. Developed countries - which are traditionally home to the owners of formal technology - have tended to promote IPRs as beneficial to development. At times, developing countries by contrast - which are generally users, but not producers, of formal technology - have criticized IPRs, arguing that they raise prices and restrict access to the new technologies needed for sustainable human development. Despite bitter disputes between developed and developing countries during the Uruguay Round of trade negotiations, minimum standards for the protection and enforcement of IPRs were inserted on the international trade agenda in the form of the TRIPS Agreement.
- The TRIPS Agreement could also affect the transfer of technology under Multilateral Environmental Agreements. Research by the secretariats of the various MEAs suggests that IPRs present both opportunities and barriers to the transfer of environmentally-sustainable technology. While the role of IPRs in technology transfer should not be overstated, it is important that IP systems complement efforts to protect the environment by encouraging the transfer of environmentally-sustainable technology and minimizing the barriers that IPRs might pose to environmental protection. Yet the TRIPS Agreement remains essentially neutral to environmental concerns. Given the immediacy of environmental degradation, promoting the transfer of technology both through the TRIPS Agreement and MEAs is critical.
- In the area of health care and access to essential medicines, implementation of the TRIPS Agreement could help consolidate market control in the hands of a few pharmaceutical companies and increase the price of pharmaceuticals. This may pose serious health risks in cases where essential drugs are needed to respond to diseases such as HIV/AIDS, tuberculosis and malaria. According to the TRIPS Agreement, Members may adopt measures to protect public health and nutrition, including through the grant of compulsory licenses to local companies, as a means of promoting the public interest. Members, however, are often faced by unilateral pressure when seeking to operationalise these measures. Greater consideration needs to be given to the public health aspects of IPRs to ensure that the TRIPS Agreement promotes and does not undermine the right to health.

Box 10 - Access to HIV/AIDS drugs in Thailand

(Source: S. Walker 2001)

The most serious health issue facing the world today is the HIV/AIDS pandemic. In countries such as Zimbabwe and South Africa, as many as one in four people are infected with the virus. While researchers have yet to find a cure for the disease, there are an increasing number of treatments that improve both the life expectancy and the quality of life of people with HIV. However, while these treatments are available in developed countries, people in developing countries are denied access to the drugs as a result of high price levels. In Africa, where 26 million of the estimated 33 million people infected with HIV are living, the prices of monthly treatments are hundreds of times the average salary levels. With production of the AIDS drug ddI in Thailand, for example, patent rights that are licensed exclusively to Bristol Myers Squibb ensure that the company controls imports and sales – giving it leeway to set prices to suit its economic objectives, but not necessarily the health objectives of the Thai people. As a result, the Thai Government has been developing strategies to lower prices of ddI as well as other treatments. For example, the Government considered granting a compulsory license of ddI technology as a means of ensuring that there would be at least one affordable, low-tech double therapy combination. The Government's proposed action was consistent with the compulsory licensing provisions under the TRIPS Agreement. The US Government, however, responded by threatening trade sanctions on key exports if the Thai Government did not change its IP laws. In particular, the US pushed for amendments to the Thai patent law that excluded the grant of compulsory licenses over pharmaceuticals as well as to abolish the Pharmaceutical Review Board, the Government body charged with surveying price levels of pharmaceuticals. The Thai Parliament passed amendments in October 1998 abolishing the Pharmaceutical Review Board. However, the Director General of the Department of Intellectual Property maintains the power to override a patent and issue a compulsory license where the patent is deemed not to be locally "worked" or if the price is considered unreasonably high.

Translating some of these ideas into action need the following:

- Appropriate actions by developing countries can generate or free up substantial additional resources, either by attracting new financing from domestic and international private sector sources or by reducing waste and inefficiency in the use of public sector resources. Such resource mobilization is key for sustainably financing development.

- Creating a positive policy environment is fundamental to achieving sustainable development. Without an appropriate policy framework, private sector resources will not be forthcoming, and public sector resources will continue to be used sub-optimally. Moreover, and perhaps as important, a positive policy environment can help channel economic activities (whether undertaken by the private or public sectors) away from environmentally harmful activities and towards more sustainable ones.
- Special attention should be provided to the needs of the poor. Any policy reform or other effort must clearly take considerable care to be pro-poor. The local communities must be made to understand that they are not just passive recipients; there is growing evidence that they can play an important, pro-active role in development processes and policies. A growing number of microfinance and sustainable livelihood initiatives are demonstrating how once-marginal communities are achieving independence through economic empowerment.
- One size does not fit all. There is substantial variation in the needs, opportunities, and constraints facing individual developing countries. Even within countries, there is substantial variation across regions or sectors. This should be understood and issues mainstreamed.

Box 11 - The triple bottom line

(Source: IMF, UNEP and The World Bank 2002)

Many corporate leaders now recognize that social development, environment, and growth are not always in conflict. For a variety of reasons reducing costs, creating new market development opportunities, protecting and gaining consumers, and managing risks companies are adopting sustainable development as a management framework to build long-term value in line with shareholders' and society's expectations. Commitment to corporate social responsibility moves companies to a "triple bottom line" of financial strength, social justice, and environmental sustainability. Public information and comparative benchmarking influence consumers, investors, public interest groups, and governments to put pressure on company performance to meet environmental and social standards.

In order to protect the environment and the resources and services it provides, it is essential that the industrialized world contribute a fair proportion of the costs of global biodiversity conservation through direct assistance and through more careful assessment of the impacts of their trade, investment and other interactions with the developing world (DFID *et al*, 2002).

Outputs from the Asia Regional Workshop

Some specific activities that can be considered to achieve this MDG include:

- Encourage regional mechanisms and cooperation on addressing issues of open-trading systems.
- Provide inputs into the decision making process under WTO to deal with issues of rule based and non-discriminatory trading, including addressing the special needs of LDCs, SIDS and landlocked countries.
- Increase the awareness and understanding on issues of debt for nature swaps and structural adjustment policies and enhance capacities of countries in negotiating such agreements
- Develop national policies on ensuring employment to youth that is based on skill development and supporting environmental management (eg. Ecotourism).
- Encourage partnerships between private – public sectors to invest in research and development of pharmaceuticals besides encouraging incentives for private sector to adopt differentiated pricing policies aimed at provision of cheaper medicines to LDS and others.
- Encourage private sector collaboration on Information and Communication Technologies (ICTs) with an aim to achieving better environmental governance and environmental sustainability.



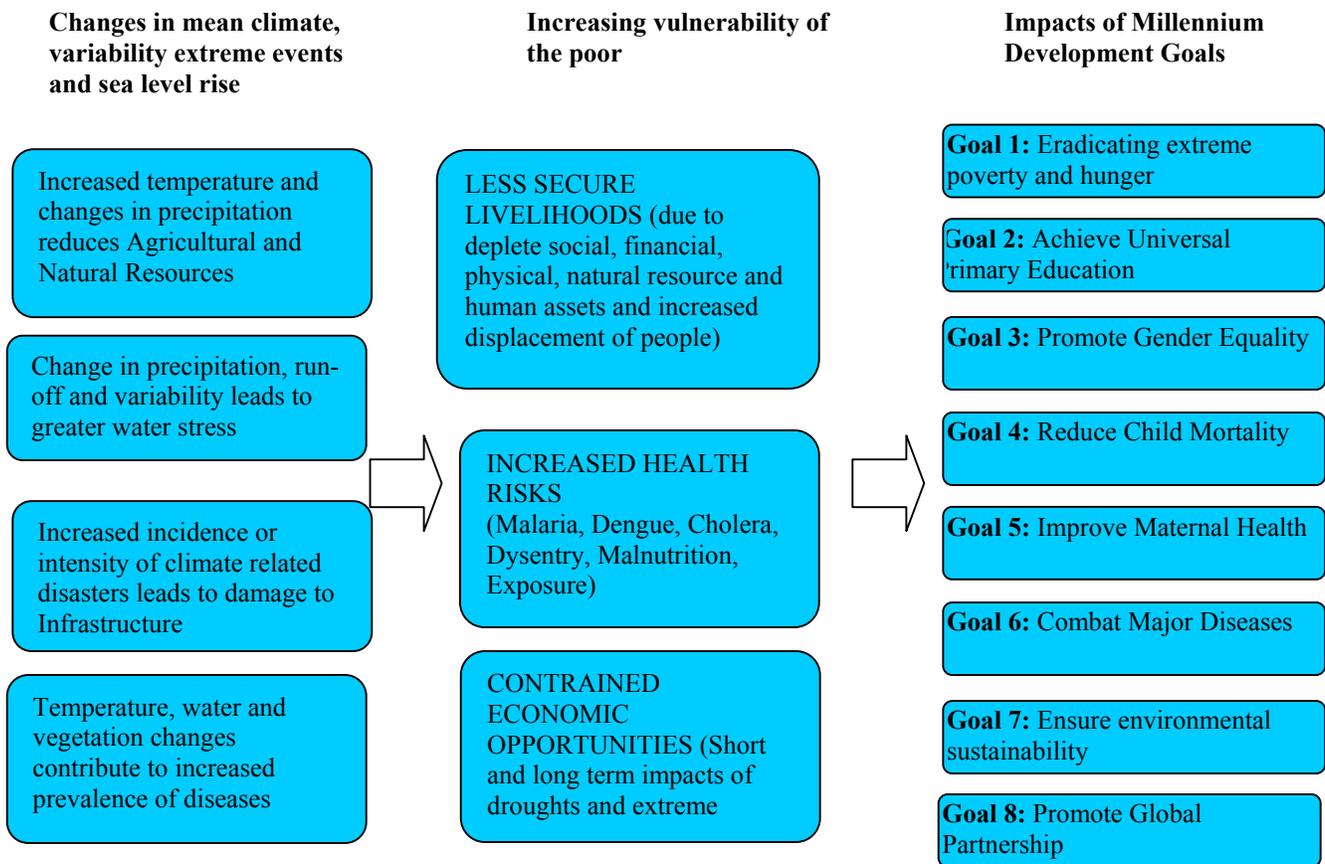
3. Climate Change, Biodiversity and Millennium Development Goals

Climate change increases the vulnerability of poor by adversely impacting their livelihoods and health as well as undermining opportunities for sustainable development. Poverty reduction can be challenged in several countries due to increased water stress, reduced food security, increased impacts of extreme weather, displacement of millions of people due to floods and sea-level rise and potentially contributes to increased incidence of vector borne diseases.

The UNFCCC Article 3.1 and the discussions at COP 7 and through the Marrakesh Accord all aim to increasing the adaptive capacities of communities and people to achieve the targets of the MDGs. Links between climate change and the MDGs are summarized in Figure 5 below.

Figure 5 - Links between Climate Change and MDGs

(Source: Anonymous 2002)



As the Johannesburg Summit (WSSD) states, "...the adverse effects of climate change are already evident, natural disasters are more frequent and more devastating and developing countries are more vulnerable...". While climate change will have global impacts, poor countries and poor people will be most vulnerable because of their high degree of dependence on natural resources that are directly impacted by climate change, their limited capacities – human, institutional, and financial – to cope, in some cases, their geographical location.

Climate change threatens to undo decades of development and poverty-reduction efforts. Climate change is also expected to contribute to chronic impacts, including severe water and heat stresses that have profound impacts on the livelihoods and health of the poor, including their assets and quality of life. This enhanced vulnerability of the poor limits the effectiveness of development interventions and raises the questions of how to most effectively integrate climate change concerns into development planning. Thus it is critical to address the issues of mainstreaming issues of climate change, biodiversity and sustainable development, including into achieving MDGs and WEHAB. The impacts of climate change on the MDGs is summarized in Table 3 below and the inter-agency paper, ‘poverty and climate change – reducing the vulnerability of the poor’ that was developed for UNFCCC COP 8 can provide more background information and details (Anonymous 2002).

Table 3 - Potential Impacts of Climate Change on the Millennium Development Goals

(Source: Anonymous 2002)

Millennium Development Goals : Climate Change as a cross-cutting issue	
<i>Millennium Development Goal</i>	<i>Examples of links with Climate Change</i>
Eradicate extreme poverty and hunger (Goal 1)	<p>Direct impacts;</p> <ul style="list-style-type: none"> • Climate Change may be reduced poor people’s livelihood assets, for example health, access to water, homes and infrastructure. • Climate change may alter the path and rate of economic growth due to change in natural systems and resources, infrastructure and labor productivity. A reduction in economic growth directly impacts poverty through reduced income opportunities. • Climate change may alter regional food security. In particular in Africa, food security is expected to worsen.
<p>Health related goals:</p> <ul style="list-style-type: none"> • Combat major diseases • Reduce infant mortality • Improve maternal health <p>(Goals 4,5 & 6)</p>	<p>Direct Impacts:</p> <ul style="list-style-type: none"> • Direct effects of climate change may include increase heat-related mortality and illness associated with heat waves (which may be balanced by less winter cold related deaths in some countries) • Climate change may increase the prevalence of some vector borne disease (e.g. malaria to dengue fever), and vulnerability to water, food or person to person borne diseases (e.g. cholera and dysentery). • Climate and pregnant women are particularly susceptible to

	<p>vector and water borne diseases. Anaemia – resulting from malaria – is responsible for a quarter of maternal mortality.</p> <ul style="list-style-type: none"> • Climate Change may also result in declining quantity and quality of drinking water, which is a prerequisite for good health and exacerbate malnutrition – an important source of ill health of among children – by reducing natural resource productivity and threatening food security, particularly in sub Saharan Africa.
Achieve universal primary education (Goal 2)	<p>Indirect impacts:</p> <ul style="list-style-type: none"> • Links to climate change are less direct but loss of livelihood assets (natural, health, financial and physical capital) may reduce opportunities for full time education in numerous ways. Natural disasters and drought reduce children’s available time (which may be diverted to household tasks) while displacement and migration can reduce access to education opportunities. •
Promote gender equality and empower women (Goal 3)	<p>Indirect impacts:</p> <ul style="list-style-type: none"> • Climate Change may exacerbate current gender inequalities. Depletion of natural resource and decreasing agricultural productivity may place additional burdens on women’s health, and reduce time available to participate in decision making processes and income generation activities. • Climate related disasters have been found to impact more severely female- headed households particularly where they have fewer assets to start with.
Ensure environmental sustainability (Goal 7)	<p>Direct impacts:</p> <ul style="list-style-type: none"> • Climate Change may alter the quality and productivity of natural resources and ecosystems, some of which may be irreversibly damaged, and these changes may also decrease biological diversity and compound existing environmental degradation
Global Partnerships (Goal 8)	<p>Direct impact:</p> <ul style="list-style-type: none"> • Global climate change is a global issue and responses require global cooperation, especially to help developing countries adapt to adverse impacts of climate change.

Modeling base on IPCC scenarios (2001) suggest that temperature rise by 2010 could lead to significant increase in potential breeding grounds for malaria in parts of Brazil, Southern Africa and the horn of Africa. In a few areas – such as parts of Namibia and the West African Sahel - malaria risk may fall due to excessive heat. In Africa, cities that currently are not risk of malaria because of their high altitudes, such as Nairobi and Harare, may be newly at risk if the range in which the mosquito can live and breed increases. Such projections are not universally accepted and vulnerability of the poor to increased risks will depend on the capacity of health authorities and individuals to take preventive action. However, increased prevalence of climate and disaster related diseases would certainly present new stresses for health systems already over-stretched by

HIV/AIDS risks. Furthermore, a number of studies suggest strong casual links – when other factors have been taken into account – between malaria incident and economic growth. For instance, Gallup and Sachs (2000) found that economic growth in counties with intensive malaria was 1.3 percent less per person per year between 1965 and 1990 than those without malaria and that a 10 percent reduction in malaria is associated with a 0.3 percent increase in economic growth.



Table - 4 Impacts of Climate Change, Vulnerability and Adaptive Capacity by Region

(Source: Anonymous 2002)

Region	Likely regional impacts of climate change	Vulnerability, adaptive capacity
Africa	<ul style="list-style-type: none"> • Increase in droughts, floods and other extreme events will add to stress on water resources, food security, human health and infrastructure, thus constraining development. • Changes in rainfall and intensified land use would exacerbate the desertification process (particularly in the Western Sahel, Northern and Southern Africa). • Sea level rise would affect coastal settlements, flooding and coastal erosion, especially along the East – Southern Africa coast. • Major rivers are highly sensitive to climate variation; decrease in run-off and water availability affecting agriculture and hydro-power systems could increase cross-boundary tensions. • Increase in frequency of some extreme events in some places. 	<ul style="list-style-type: none"> • Adaptive capacity is low due to low GDP per capita, widespread poverty) the number of poor grew over the 1990s), inequitable land distribution, and low education levels. There is also an absence of safety nets, particularly after harvest failures. • More than one quarter of the population lives within 100km of the coast and most of Africa’s largest cities are along coasts vulnerable to sea level rise, coastal erosion and extreme events. • Individual coping strategies for desertification are already strained, leading to deepening poverty. Dependence on rain-fed agriculture is high. • Adaptive capacity is likely to be greatest in counties with civil order, political openness and sound economic management.
Asia	<ul style="list-style-type: none"> • Extreme events have increased in temperate Asia including floods, droughts, forest fires and tropical cyclones. • Thermal and water stress, flood and drought, sea level rise and tropical cyclones would diminish food security in countries of arid, tropical and temperate Asia; agriculture would expand and increase in productivity in northern areas. • Reduced soil moisture in the summer may increase land degradation and desertification. • Sea level rise and increase in intensity of tropical cyclones would displace tens of millions of people in low-lying coastal areas of temperate and tropical Asia. 	<ul style="list-style-type: none"> • Adaptive capacity varies between countries depending on social structure, culture, economic capacity and level of environmental degradation. • As a region, poverty in both rural and urban areas has decreased in Asia. • Capacity in increasing in some parts of Asia (for example, the success of early warning systems for extreme weather events in Bangladesh), but is still restrained due to poor resource bases, inequalities in income, weak institutions and limited technology.
Latin America	<ul style="list-style-type: none"> • Loss and retreat of glaciers would adversely impact runoff and water supply in areas where snowmelt is an important water resource. • Floods and droughts would increase in frequency and lead to poorer water 	<ul style="list-style-type: none"> • Some social indicators have improved over the 1990s, including adult literacy, life expectancy, access to safe drinking water. • Other factors such as infant mortality, low secondary school enrolment and high income inequality contribute to limited adaptive

Region	Likely regional impacts of climate change	Vulnerability, adaptive capacity
	<p>quality in some areas.</p> <ul style="list-style-type: none"> • Increase in the intensity of tropical cyclones would alter the risks to life, property and ecosystems from heavy rain, flooding, storm surges and wind damages. • Coastal human settlement, productive activities, infrastructure and mangrove ecosystems would be negatively affected by sea level rise. 	<p>capacity</p>
Small Island States	<ul style="list-style-type: none"> • The projected sea level rise of 5 mm yr⁻¹ for the next hundreds years would cause enhanced soil erosion, loss of land, poverty, dislocation of people, increased risk from storm surges, reduced resilience of coastal ecosystems, saltwater intrusion into freshwater resources, and high resource costs to respond to and adapt to changes. • Coral reefs would be negatively affected by bleaching and by reduced calcification rates due to higher carbon dioxide levels; mangrove, sea grass bed and other coastal ecosystems and the associated biodiversity would be adversely affected by rising temperature and accelerated sea level rise. 	<ul style="list-style-type: none"> • Adaptive capacity of human systems is generally low in small island states, and vulnerability high; small island states are likely to be among the countries most seriously impacted by climate change. • Islands with very limited water supplies are highly vulnerable to the impacts of climate change on the water balance. • Declines in coastal ecosystems would negatively impact reef fish and threaten reef fisheries, those who earn their livelihoods from reef fisheries and those who rely on the fisheries as a significant food source. • Limited arable land and extensive soil salinization make agriculture on small islands, both for domestic food production and cash crop exports, highly vulnerable to climate change. • Tourism, an important source of income and foreign exchange for many islands, would face severe disruption from climate change and sea level rise.

Some issues that need consideration while addressing issues of climate change and MDGs

General considerations:

- Vulnerability assessments should be based on socio-economic and cultural regimes, at national levels.
- Activities and policies dealing with preparedness to climate variability need to be recognized as different from those of climate change.
- National assessments on impacts of climate change to food security must receive priority attention.

- Hazard mapping for each possible impact of Climate Change and Climate Variability, Glacier Lake Outburst Floods, Flash floods, droughts, Sea Level Rise etc be taken up urgently.
- Early warning systems for each of the hazards be developed, warnings effectively disseminated to vulnerable communities
- Adaptive capacities of local communities to current and future adverse situations be enhanced
- Media be assisted with appropriate materials for effective dissemination of information to policy makers, and to people, in general, on probable adverse impacts of climate change
- Develop bench-marks for future monitoring of impact of climate change and biodiversity as well as for overall sustainable development process.

Climate Change and MDG 1

- Adverse effects of climate change and climate variability viz: flood, drought, sea level rise, rainfall variability and GLOF are of direct relevance to MDG1.
- Floods cause loss of agricultural productivity, and also livelihoods, leading to out migration.
- Sea Level Rise causes loss of coastal land, saline water intrusion; impact on fisheries and local livelihoods are significant.

Climate Change and MDG 2

- Renewable sources of energy offer significant ways of reducing burdens on women as well as provide positive incentives for time budgeting of girl child and women.
- Provision / identification of sustainable and safe drinking water sources would ensure children having more time for schooling.

Climate Change and MDG 3

- Women and children are more vulnerable to disasters resulting from effects of climate change. Therefore it is important to pay attention to needs of women and children while designing disaster mitigation plans.
- Provision of alternate livelihood sources is critical for ensuring gender equalities. These can be through training on aspects like organic farming, value-added produce development etc.

- Access to micro-finance specially for those who are vulnerable to impacts of Climate Change is required as a risk management option at local level.

Climate Change and MDG 4 & 5

- Provision of safe drinking water is important to prevent child mortality in rural areas. Climate variabilities like floods often impede such sources.
- Introduction of special child/mother clinics during flood and drought can support better health care.

Climate Change and MDG 6

- Climate change impacts incidence of vector borne diseases. Base line data and studies on such diseases are needed for tropical countries.
- Steps to curb vector/water borne diseases (e.g: tick borne encephalitis) with rise in temperatures should be better tackled through awareness raising, public participation and setting minimum standards of hygiene.

Climate Change and MDG 7

- Climate change impacts due to ecosystem disturbance should be addressed using an ecosystem approach
- Environmental management plans should consider issues of impacts of climate change on ecosystems – their services and products.
- Forest conservation policies must address issues of maintaining appropriate forest cover
- Afforestation and reforestation activities should be responsive to adaptation issues



4. Conclusion

Achieving synergies between implementation of CBD, UNFCCC and MDGs is a key issue to achieve sustainable development. Agencies like Secretaries to Conventions, UNDP, UNEP and others have started thinking about bringing synergies to action. Specific and joint work programmes should be developed as a part of Joint Liaison Group and Ad Hoc Technical Expert Group. A specific inter-agency working group with a mandate to address synergies in Action must be established and linkages to on-going ground work be developed. The Operational Programme 12 of the GEF explicitly encourages interventions aimed at considering an ecosystem approach. The ecosystem approach, adopted by the Parties to the CBD, aims to consider conservation actions through synergetic approaches. Encouraging Parties to submit innovative project ideas under the GEF's OP 12 dealing with ecosystem approach should be explored. Countries should be encouraged to specifically design programmes on synergies as a part of their national strategy and action plan.

At the national level, the agencies coordinating implementation of the Conventions and Processes must establish a joint working group involving stakeholders and focal points of the Convention to discuss options and actions. The Capacity Development Initiative (CDI) must address the issue of synergies specifically and all National Capacity Self Assessment (NCSA) activities must focus on this at national level. Agencies mandated to implement the Millennium Development Goals (MDGs) and WSSD outcomes (including those addressing WEHAB issues) must design processes on synergies soon, so that action of implementation can be inclusive.

At the local level, synergistic action should involve translating and scaling up local experiences into regional and national actions, development of replicatory models and influencing larger policy through action form the priorities. Initiatives like the Equator Initiative, Small Grants Programme of GEF have unique opportunities to identify such action and support replication and if need be improvement.

The key environmental agreements also contain many similar requirements for action, research, reporting and other necessary activities agreed by their signatories.

- Approaches to goals – The instruments adopt similar approaches to achieve their goals. They recognise needs for national action guided by international experiences. All of them

recognise the need for capacity building and awareness rising as a pre-condition to their success. All of them also identify the need for cooperation.

- Approaches to activities - All of these instruments promote activities of research, assessments, information exchange, training, development of strategies and action plans and inventories. However, the decisions of design and detail are left open for interpretation by individual governments.

It is truism that we work in a world in which governments work primarily in a sector-based mode to develop and implement their policies and programmes. We need to bring in some changes to this scenario. Suggestion or recommendation for this include the following:

- Enhancing the institutional outlook
- Building capacities – both at personal and institutional levels
- Modifying National Planning processes
- Strengthening the information base.

Institutional Outlook

With the overall framework of policymaking, planning and implementation of Rio Conventions and other Sustainable Development related policies, there are several core activities, which are particularly amenable to the issue of institutional synergies. These are:

- Awareness raising
- Education
- Reporting
- Data gathering and inventories
- Public participation
- Research and Training

To achieve these synergies it may be useful to consider the following options:

- a) A crosscutting national committee to bring together key players - This is not new for several countries. National Planning Commission is a committee that brings together

such players to decide on plans and budgets. Creation of a National Committee on Sustainable Development is an option.

- b) Separate institutions with a coordinating mechanism - Several countries work on this principle at least in sectors like finance, banking and health. Similar model for environment may be an option.
- c) A single institution responsible for all instruments – Many countries have Ministries of Environment and Natural Resources, which deal with several environment issues, but linkages within them are often weak.

At local level, some options include:

- a) Creation of a coordinating committee representing all sectors
- b) Making locally elected democratic institutions responsible for environment and development
- c) Using groups and institutions like CBOs, Churches and Women's groups.

Building Capacities

Capacity building and strengthening is urgently needed. Many countries are overtaxed by the competing demands and obligatory activities in addition to reporting requirements and monitoring.

Given this, it is important for countries to enhance their capacities. The GEF's Capacity Development Initiative (CDI) is a welcome option but falls short of addressing or supporting actual activities. Also, the implementation of CDI is in question due to the approval of only phase I of CDI by the GEF council where support is provided for National Capacity Self Assessments (NCSA) without clear emphasis on how countries can implement outcomes of NCSA. This makes CDI's use and effectiveness limited.

The general capacity needs to address synergistic activities include capacities on:

- Making inventories, monitoring and systematic observations
- Planning, policy development and reform of legal frameworks

- Impact assessment and research
- Information, knowledge and data management
- Reporting and monitoring
- Education, Training and Public awareness

Capacity building on these can be categorized to human resources, infrastructure development, coordination and cooperation.

Modifying National Planning Processes

Plans to implement the Conventions can foster synergies if they meet the following conditions.

- 1) Plans should be consistent with goals of national development
- 2) Plans should identify the roles of the Conventions and other commitments at national, regional and global levels.
- 3) Plans should identify areas where overlaps and conflicts can occur and suggest means of turning them into opportunities of synergies.

Given this there are three possibilities to address national planning processes that can be responsive.

- a) Develop separate plans for each agreement – Currently, this option receives both financial and political support that is neither effective nor suppressive of synergies. However, this should change.
- b) Develop a new Umbrella Plan incorporating elements of all agreements - This is a good choice provided the institutional mechanism for planning and implementation are in place.
- c) Develop a mechanism to integrate planning associated with the instruments into existing national plans and planning frameworks – This is the best option in the current situation but outlook and capacities to do so are weak.

Strengthening Information Base

Strong information systems, efficient networks and intelligent synthesis of these into knowledge equips a country to regularly assess the countries status and progress and plan for sustainable

development. Implementation of all the agreements needs a good information base. Creation of this base with an implicit design for planning and monitoring is thus needed.

Countries and Conventions should also understand that information on its own merit is of little relevance for implementing activities. Information should be analysed and use in an integrated manner so that the information available through the clearing house mechanisms can be meaningful.

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