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SCOPING PAPER FOR THE

TECHNICAL PAPER:

CLIMATE CHANGE AND BIOLOGICAL DIVERSITY

(Submitted by the Chairman)

It may be recalled that the Panel decided to prepare a Technical Paper on Climate Change and Biological Diversity at its Seventeenth Session (Nairobi, 4-6 April 2001). It had at the time requested a scoping paper for its consideration.

I. TECHNICAL PAPER

II. REQUESTED BY UN CONVENTION ON BIOLOGICAL DIVERSITY

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I. Background

Genesis of the request for the Technical Paper

II. Introduction

[1 IPCC page]

Biodiversity here is taken to include the genetic level (i.e., the richness of genetically different types within the total population), species (i.e., the richness of species in an area) and ecosystem or landscape level (i.e., the richness of ecosystem types within a given area). Biodiversity here includes the highly managed systems (agriculture, forestry and aquaculture) and non-intensively managed ecosystems and their components. In many cases, changes in biodiversity can be reflected in changes in parameters such as productivity and population sizes which are important variables in terms of assessing the impacts of climate change. Many indigenous, pastoralist and rural communities are heavily dependent on biodiversity (food, fibre, medicinal plants and tourism) and thus the impact of climate change on these communities will also be included in this paper.

Many goods and services that are obtained from sectors (eg. Agriculture) or ecosystems such as agroecosystems, forests, wetlands, coastal and marine systems are crucial to human survival. These goods and services include food, fiber, fuel and energy, fodder, medicines, clean water, clean air, flood/storm control, pollination, seed dispersal, pest and disease control, soil regeneration biodiversity and recreation/amenity. Society places value on these goods and services either directly or indirectly. Ecosystems play a critical role in biogeochemical and physical processes that link the biosphere and atmosphere and hence are important for the functioning of the earth's systems. Ecosystems are subject to many pressures (e.g., land-use changes because of increasing resource demands and urbanisation) and hence their extent and pattern of distribution is changing resulting in more fragmented landscapes. Climate change constitutes an additional pressure and thus changes in global climate and atmospheric composition are likely to have an impact on most of these goods and services, with significant impacts on socio-economic systems (WGII, Ch5.1).

There is already evidence showing that recent regional climate changes, particularly temperature increases have already affected many ecological systems and that future changes in climate directly or indirectly are likely to adversely affect biodiversity at all levels. Options for mitigating climate change through land-use, land-use change and forestry (LULUCF) activities can have beneficial and/or adverse environmental and social impacts, in particular on biodiversity, and these will be discussed in this paper.

Specifically issues that will be examined here are:

- what is the impact of climate change on biodiversity and what is the impact of changes in biodiversity on climate?
- what are the effects of potential LULUCF mitigation options for climate change on biodiversity?
- what is the effect of conservation and management of biodiversity options on climate change?

All of the information contained in the Technical Paper will be drawn from previously approved/adopted/accepted IPCC reports. The Third Assessment Report (TAR), the Special Report on Land Use, Land Use Change and Forestry (LULUCF) and the soon to be completed Synthesis Report (SYR), will be used for much of the information. Impacts of climate change on a region by region basis would come from the regional chapters of the TAR, particularly the Working Group II (WGII) report and the Regional Impacts of Climate Change (RICC) Report. This material will be supplemented by material from the Second Assessment Report (SAR) and other relevant Technical and Special Reports of the IPCC. Many of the bullets below in this Scoping Paper are from the SPMs of the various reports and are used as a way of illustrating the type of information that could be expanded in each of the sections.

III. Observed Changes in Climate

[2 IPCC pages supplemented with figures]

Classical measures of the Earth's climate system, e.g., temperature, precipitation, sea level, extreme events including floods, droughts, and storms, and other components e.g., greenhouse gases and aerosols have been monitored over long periods at the global level. Climate change, as defined in IPCC, refers to statistically significant variations that persist for an extended period, typically decades or longer. It includes shifts in the frequency and magnitude of sporadic weather events as well as the slow continuous rise in global mean surface temperature. Thus the observed changes include climate-weather variations on all temporal and spatial scales, ranging from brief-lived severe storms to seasonal El Ninos, decadal droughts, and century shifts in temperature and ice cover (SYR, Q2).

Examples of key findings regarding observed changes in climate that affect biodiversity include:

- *an increasing body of observations gives a collective picture of a warming world and other changes in the climate system*
- *atmospheric concentrations of greenhouse gases have increased as a result of human activities. From 1750 to 2000, the concentration of CO_2 increased by 31±4%, and that of CH_4 rose by 150±25%*
- *the global-average surface temperature over the 20th century has increased by 0.6+/-0.2°C*
- *on average, from 1950 to 1993, night-time daily minimum air temperatures over land have increased by 0.2° C per decade and day-time by 0.1° C per decade*
- *snow cover and ice extent have decreased*
- *precipitation has very likely increased during the 20th century by 5 to 10% over most mid- and high-latitudes of the northern hemisphere continents and by 2 to 3% over most tropical land areas.*

- *warm episodes of the El Niño/Southern Oscillation (ENSO) phenomenon have been more frequent, persistent, and intense since the mid-1970s, compared with the previous 100 years.*
- *in the light of new evidence and taking into account the remaining uncertainties, most of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas abundances.*
- *many other climate changes, particularly short-lived extreme events or small-scale regional changes are beyond such attribution.*

[Information from TAR WGI, SPM, Ch1, 3, 5, 11, SYR Q2 and Q9 will be relevant here]

IV. Projected Changes in Climate

Changes in climate occur as a result of internal variability of the climate system and external factors (both natural and as a result of human activities). Emissions of greenhouse gases and aerosols due to human activities change the composition of the atmosphere. Future emissions of greenhouse gases and aerosols are determined by driving forces such as economic growth, technological and demographic changes and governance. The greenhouse gas emissions scenarios used as the basis for the climate projections in the TAR are those contained in the IPCC Special Report on Emissions Scenarios. The SRES scenarios consist of six scenario groups, that should be considered equally sound, and which span a wide range of these driving forces (SYR, Q3, Q1). Examples of projected changes that would have impact on biodiversity include:

- *the globally averaged surface temperature is projected to increase by 1.4 to 5.8°C over the period 1990 to 2100*
- *it is very likely that nearly all land areas will warm more rapidly than the global average, particularly those at northern high latitudes in the cold season*
- *global average precipitation is projected to increase during the 21st century, though at regional scale both increases and decreases are projected*
- *extreme climatic events are projected to increase, eg. number of hot days and heat waves, intense precipitation events, summer drying over most mid-latitude continental interiors, tropical cyclones with the associated wind and precipitation intensities and intensified floods and droughts associated with El-Nino type events. Number of cold days and frost events are projected to decrease.*
- *global mean sea level is projected to rise by 0.09 to 0.88 metres between 1990 and 2100*
- *the projected range of regional variation in sea-level change is substantial compared to projected global-average sea-level rise, because the level of the sea at the shoreline is determined by many factors*
- *glaciers and ice caps are projected to continue their widespread retreat during the 21st century*

[Information from TAR WGI, SPM, Ch3, 9, 11, SYR Q3, 4, 5 will be relevant here]

V. Observed Changes in Terrestrial and Marine Ecosystems Associated with Climate Change

[2 IPCC pages supplemented with figures/tables]
Studies that measured changes in biological parameters (such as the start and end of breeding seasons, migration patterns and times, ranges of animals, body size or mass (due to longer growing season) and temperature (which is often the biologically important trigger along with day length) over a decade or more were assessed in the TAR, WGII (particularly Ch 5.4). Most of these studies have been carried out (due to research funding decisions) in the temperate and high latitude areas and in some in high altitude areas (TAR WGII, 5.2, 5.4). Examples of key conclusions are:

- *some ecosystems have already been affected by changes in climate and are considered to be particularly sensitive to changes in regional climate, eg. coastal (including coral reefs) and high altitude and latitude ecosystems.*
- *regional changes in climate, particularly increases in temperature, have already affected a diverse set of physical and biological systems in many parts of the world. These include changes in species distributions (or ranges), population sizes, the timing of reproduction or migration events and lengthening of growing season in the mid- to high-latitudes in northern hemisphere. Some of these changes could lead to population or species extinction, especially in species whose ranges are restricted altitudinally or by other barriers (e.g., lack of suitable habitat)*
- *increased frequency of coral bleaching in some reefs has been linked to increased sea surface temperatures of 1°C as commonly occurs during El Nino events.*
- *changes in marine systems, particularly fish populations, are clearly linked to large-scale climate shifts and affect socio-economic systems.*
- *changes in stream flow, floods, and droughts have impacted goods and services from ecosystems (eg. freshwater fisheries, wetland flows) and socio-economic systems*
- *increases in water temperature have caused an increase in summer anoxia in deep waters of stratified lakes with possible effects on their biodiversity*

[information from the TAR WGII Ch 5, 6, 8, 9, 10-17, Synthesis Report, Q2, SAR and RICC Report will be relevant here]

VI. Projected Impacts of Mean Changes in Climate on Terrestrial and Marine Ecosystems

[6 IPCC pages supplemented with tables]
Climate change is projected to affect populations, species diversity and ecosystems directly (for example through increases in temperature, changes in precipitation and in the case of marine systems changes in sea level etc) and indirectly (for example through climate changing the intensity and frequency of disturbances such as wildfires). The most significant processes are habitat loss and fragmentation (or reconnection in the case of freshwater bodies); the introduction of exotic species (invasives), and direct effects of climate change for example on reproduction, dominance and survival. No realistic projection of the future state of the earth's

ecosystems can be made without taking into account human land-use patterns; past, present and future. Human land-use will endanger some ecosystems, enhance the survival of others and greatly affect the ability of organisms to adapt to climate change via migration (TAR WGII, 5.2).

Modelling approaches used for projecting impacts of climate change on biodiversity

Most impacts of climate change on ecosystems are projected using a range of models which can be classified into "ecosystem-based" and "species-based" models. Each of these approaches has limitations in terms of projections of climate change on biodiversity but in addition neither deal with a fragmented landscape that exists on many continents as a result of human activities. Realistic projections of impacts of climate change on ecosystems and species has to deal with a fragmented landscape as the impact of climate change on biodiversity cannot always be differentiated from the effects of other human activities. In particular land use change can affect ecosystems directly, but can also affect the future migration of many plant and possibly animal species. Only recently have models been developed that could deal with fragmented landscapes (TAR WGII, 5.2).

Ecosystem functions such as production and decomposition are highly sensitive to changes in climate, but also to atmospheric CO_2 concentration. Climate change may either augment or reduce the direct effects of CO_2 on productivity, depending on the type of vegetation, the region, and the scenario of climate change

Projected impacts of changes in mean temperature and precipitation on terrestrial ecosystems

Example of projected changes include:

- *biodiversity overall is forecast to decrease in the future due to a multitude of pressures, in particular increased land-use intensity and the associated destruction of natural or semi-natural habitats. In a few cases there might be an increase in local biodiversity as a result of introduction of exotic species (invasives) due to direct effects of climate change and/or fragmentation (or reconnection in the case of freshwater bodies) of landscapes*
- *a potential for significant disruption of ecosystems affecting many ecosystem functions, eg. productivity, decomposition*
- *increasing CO_2 concentrations would increase net primary productivity and net ecosystem productivity in most vegetation systems, causing carbon to accumulate in vegetation over time*
- *increased risk of extinction of vulnerable species for very minimal changes in climate (eg. 1^oC additional warming in high latitude/altitude regions)*
- *largest and earliest impacts induced by climate change are projected to occur in boreal forests where changes in weather-related disturbance regimes and nutrient cycling are primary controls on productivity*
- *rangeland plant production, species distribution, disturbance regimes (eg. frequencies of fires, insect/pest outbreaks), grassland boundaries would be affected by potential changes in climate and land use*

- *reduced average annual surface water runoff in some areas and increased annual runoff in others would affect many ecosystem functions. In snowmelt dominated watersheds, earlier snowmelt and a smaller proportion of winter precipitation falling as snow is projected to shift peak river flows toward winter from spring and may intensify peak flows thus changing the phenology of many species*
- *climatic change and other pressures making inland waters that are small and/or downstream from many human activities vulnerable*
- *peatlands underlain by permafrost could become net carbon sources rather than sinks. With climate warming drainage of tropical peatlands could lead to increased risk of fires and affect the viability of tropical wetlands*

[information from the TAR to reflect sector by sector as well as major biomes could be relevant here. WGII Ch 5, 6, 10-17, Synthesis Report, Q3, Q4, SAR and RICC Report have such information]

Projected impacts of changes in mean changes in sea level and storm surges

Examples of projected changes due to sea level rise and climate change include:

- *many coastal systems will experience increased levels of inundation and storm flooding, accelerated coastal erosion, seawater intrusion into fresh groundwater, encroachment of tidal waters into estuaries and river systems, elevated sea surface temperatures and ground temperatures prevailing wave activity and storm waves and surges. Thus ecosystems will be adversely affected by many of these changes*
- *sea level rise of about a half-meter would inundate significant portions of many small, low lying islands and thus their coastal ecosystems. Resources critical to island societies and economies such as freshwater, fisheries, coral reefs and atolls, beaches, and wildlife habitat would be adversely impacted*
- *negative impacts on coral reefs through increased bleaching and reduced calcification rates due to higher carbon dioxide levels*
- *traditional indigenous societies in coastal areas and/or small islands are vulnerable due to their dependence on climate sensitive resources for subsistence hunting and gathering and sometimes low capacity to adapt to changes in the productivity, abundance or geographic distribution of these resources*
- *a number of marine mammal and bird species may be adversely affected as they are dependent on coastal fish that are sensitive to inter-annual and longer-term variability in oceanographic and climatic parameters.*

[information from the TAR WGII Ch 4, 5, 6, 10-17, Synthesis Report, Q3, Q4, SAR and RICC Report could be relevant here]

Projected changes related to extreme climatic events

[1 IPCC page]
Extreme climatic events have and would continue to have major impacts on biodiversity. Examples include:

- *projected higher maximum temperatures, more hot days and heat waves could lead to increased heat stress in livestock and wildlife*
- *projected increasing minimum temperatures, fewer cold days, frost days and cold waves could lead to extended range and activity of some pest and disease vectors*
- *projected increased summer drying over most mid-latitude continental interiors and associated risk of drought could lead to decreased water resource quantity and quality, physiological stress on animals through changes in forage quality, decreased rangeland productivity in drought- and flood-prone regions and increased risk of forest and rangeland fires*

[Information from TAR WGII SPM; Ch 4, 5, 6, 10-17, SYR Q4 will be relevant here]

Projected changes in various regions

[3 IPCC pages]

These are examples and a table could be developed based on IPCC regions to show region specific information. Examples of the projected changes (divided into two crude geographic regions) include:

Mainly for tropical or subtropical regions

- *decrease in runoff and water availability in many arid and semi-arid parts of the world, affecting many ecosystems and could exacerbate land degradation including desertification*
- *changes in productivity in many ecosystems due to projected change to a more El Niño-like average state for some parts of the world*
- *negative impacts on coral reefs through increased bleaching and reduced calcification rates due to higher carbon dioxide levels;*
- *extension of ranges of infectious disease vectors could affect some wildlife species and thus impact socio-economic systems*
- *significant local and global extinctions of plant and animal species and would affect rural livelihoods, tourism and genetic resources*
- *sea level rise and an increase in the intensity of tropical cyclones and heavy rainfall events could affect low-lying coastal areas due to flooding, storm surges, and wind damage and lead to coastal erosion, coastal flooding, saltwater intrusion into freshwater habitats and loss of coastal ecosystems*

Mainly for northern hemisphere regions

- *increased production in some ecosystems, for example forests, in the northern mid-high latitudes for modest warming*
- *earlier spring peak flows and possible reductions in summer flows in watershed dominated by snow or icemelt (from glaciers) affecting seasonality of many ecosystems*
- *little capacity and few options for adaptation of ecosystems and indigenous communities in polar regions making them highly vulnerable to climate change*
- *changes in permafrost temperature, surface morphology, and distribution.*

[Information from TAR WGII SPM, Ch 10-17, RICC Report and SYR, Q8 will be relevant here]

VII. Impact of Changes in Biodiversity on Climate

[2 IPCC pages]

Human activities, such as land use and land cover change have affected many ecosystems and biomes and thus the biodiversity in them. These changes modify energy, water and gas fluxes and land surface characteristics, and affect atmospheric composition creating changes in local/regional climate and also changing the disturbance regimes. They can interact with climate change and in turn would affect projected climate change. Specifically, changes in biodiversity could affect climate change through uptake and release of greenhouse gases (mainly atmospheric CO_2 concentrations and methane) and through changes in surface albedo. Examples include:

- *the terrestrial ecosystems at present are a sink for carbon due to past land management practices, CO_2 fertilisation effect on plant photosynthesis (either directly via increased carbon assimilation, or indirectly through higher water use efficiency), nitrogen deposition (especially in the northern hemisphere) and climate change. This sink is likely to level off or decrease with increased warming by the end of the 21st century due to an increase in plant and soil respiration and changes in disturbance regimes (eg. fire and insect outbreaks) mediated through climate change. Changes in disturbance regimes could affect the large stores of carbon in terrestrial systems*
- *in the Arctic, changes in forests/grassland/shrubland/wetland extent and boundaries could enhance projected regional warming*
- *in areas without surface water (typically semi-arid or arid), evapotranspiration and the albedo affect the local hydrologic cycle and thus a reduction in vegetative cover could lead to reduced precipitation at local/regional scale and change the frequency and persistence of droughts*
- *changes in decomposition of leaf litter due to possible changes in decomposer communities as a result of climate change and/or atmospheric CO_2 concentrations.*

[information in TAR WGII Ch 5, 6, 10-17, LULUCF Report will be relevant here]

VIII. The Potential For Climate Change Adaptation Options to Contribute to the Conservation and Sustainable Use of Biological Diversity

[1 IPCC pages]

There are a number of potential adaptation options that can contribute to the conservation and sustainable use of biological diversity,. Examples include:

- *designing terrestrial and marine multiple-use reserves and protected area which incorporate corridors that would allow for migration or organism as a response to climate change*

- *expanding aquaculture to relieve stress on natural fisheries*
- *specific management in some ecosystems could reduce pressures on biodiversity and even enhance biodiversity, e.g., in the Arctic, economic diversification could reduce the pressure on wildlife, multiple cropping in some agroecosystems could enhance biodiversity, rotational cropping and decreased use of marginal lands in semi-arid areas could reduce biodiversity loss*
- *integrated land, water and marine area management with the aim of reducing non-climate stresses could be beneficial to biodiversity, e.g., reduction of fragmentation of land and water systems, reduction of land-based pollution into marine systems such as coral reefs*
- *others that could benefit biodiversity include:: efficient use of natural resources, small-scale restoration of inland wetlands, restoration of degraded soils especially in rangelands, adjustment in the timing and intensity of livestock grazing*

[information in TAR WGII Ch 5, 6, 10-17, SAR, WGII Ch3-6 will be relevant here]

IX. Mitigation Options for Climate Change and its Impacts on Biodiversity

[1 IPCC page]

Human activities, eg. fossil fuel use, land use land cover change, have resulted in substantial amounts of carbon being added to the atmosphere. About 28% of the carbon since the 18^{th} century has been retained in the atmosphere and the remainder is estimated to have been taken up, in approximately equal amounts, by oceans and the terrestrial ecosystems. Between 1980 and 1998, the terrestrial ecosystems have been a small net sink for carbon dioxide probably as a result of land use practices and natural regrowth, the indirect effects of human activities, including the CO_2 fertilisation effect and nitrogen deposition and changing climate. Projections suggest that the additional terrestrial uptake of atmospheric CO_2 on a global scale may continue for a number of decades but may then gradually diminish and could even become a source by the end of the 21^{st} century. This conclusion does not consider the effect of future deforestation, land degradation or actions to enhance the terrestrial sinks (LULUCF Report SPM).

Impact and potential of afforestation, deforestation and reforestation on biodiversity

[3 IPCC pages]

Definitions of afforestation, deforestation and reforestation are based on the concept of land-use change (current approach suggested in the July version of the Minister Pronk's text):

- afforestation - the establishment of forest on land that has been without forest cover for a period if time (eg. 20 to 50 years) and was previously under a different land use
- reforestation - the conversion of non-forested land to forest land, with the land being under a different land use over historical times
- deforestation - the conversion of forest land to non-forest land

These can have benefits to the environment (including biodiversity) or also pose risks of negative impacts. Consistency with national and/or international sustainable development goals could reduce the risk of the negative impacts. Impacts include:

- *reforestation or afforestation activity benefits could include an increase in the diversity of flora and fauna, except in cases where biologically diverse non-forests ecosystems (eg. grasslands) are replaced by forests consisting of single or few species. These negative impacts could be minimised by measures that lengthen rotations, maintain understory vegetation, use native tree species and minimise chemical inputs. Afforestation can have varied impacts on ecosystem functions, such as water run-off and nutrient cycling.*
- *avoiding deforestation can provide potentially large co-benefits, including conservation of biodiversity, soil resources and maintenance of non-timber forest products.*
- *increasing tree cover or protecting it from being decreased can improve and protect soil quality in areas that are vulnerable, eg. steep hillsides, stabilise watershed flows thus potentially indirectly benefit biodiversity.*

[Information from LULUCF Report SPM, Ch2, 3, 5 will be relevant here]

Impacts and potential of land management that could contribute to conservation of biodiversity

[2 IPCC pages]

Sustainable management of ecosystems could help in adaptation and mitigation options. Thus, there is potential to consider developing synergies between land use, land use change and forestry activities that contribute to the mitigation or adaptation to climate change and the goals of UN Convention on Biological Diversity. In addition to ARD activities under Article 3.3 (previous section), there could be improved land management (croplands, rangelands and forests) and land cover change (eg. agroforestry) under Article 3.4 of the Kyoto Protocol. Due to the extensive areas of croplands, rangelands and forests, improved management could have significant positive and/or negative associated impacts on biodiversity and landscapes. Impacts of potential land management activities on biodiversity could include:

- *specific activities under land management change in tillage method, fertilisation or cover crops to reduce soil erosion and thus increase biodiversity of agroecosystems*
- *managing agricultural soils to sequester more carbon could reduce soil erosion and thus benefit the surrounding ecosystems*
- *forest regeneration, enrichment planting, change in tree species, forest fire management, reducing forest degradation could have negative and/or positive impacts on biodiversity*
- *intensive forest management that increase the tree biomass may have some negative impacts on ecosystem functions; alternatively if current commercial management practices are modified to for example extended rotation length, reduced impact logging, ecosystem functions may benefit.*

[Information from LULUCF Report SPM, Ch2, 3, 5 will be relevant here]

Tools to assess the impacts of LULUCF activities on biodiversity and sustainable development

[2 IPCC pages]
A number of existing tools can be usedto assess the impacts of LULUCF mitigation measures on biodiversity and sustainable development, including project-, sector- and regional-level environmental and social impact assessments. These and other tools can be used to quantitatively assess the synergies and tradeoffs related to LULUCF activities under the UNFCCC and its Kyoto Protocol in the context of sustainable development including a broad range of environmental, social and economic impacts, such as (i) biodiversity; (ii) the quantity and quality of forests, grazing lands, soils, fisheries and water resources; (iii) the ability to provide food, fiber, fuel and shelter; and (iv) employment, human health, poverty and equity. A system of criteria and indicators could be used to assess and compare sustainable development impacts across LULUCF alternatives. However, while there are no agreed upon set of criteria and indicators, several sets are being developed for closely related purposes. Findings to date include:

- *converting non-forest land to forest will typically increase the diversity of flora and fauna, except in situations where biologically diverse non-forest ecosystems such as native grasslands, are replaced by forests consisting of single or a few species.*
- *sustainable development contributions of LULUCF activities and projects to mitigate and adapt to climate change include: institutional and technical capacity to develop and implement guidelines and procedures; extent and effectiveness of local community participation in the development, implementation, and distribution of benefits; and transfer and adoption of technology.*

Other mitigation activities

[Half an IPCC page]

Iron fertilisation and subduction of carbon dioxide on the ocean floor on the ocean biodiversity are examples that could be explored here.
[Material of relevance here could be SAR, WGII]

X. Potential Contributions from the Conservation and Sustainable Use of Biological Diversity to Climate Adaptation Options

[2 IPCC pages]
There are potentially many examples in the regional chapters of the TAR WGII and RICC Report that will be relevant here. General examples include:

- *the use of genetic diversity in crops for adaptation to increased temperature, elevated CO_2 concentrations and changes in soil moisture levels.*
- *particular species or varieties for agroforestry or forestry under climate change*
- *varieties of plants that have different susceptibility to pest and diseases that may become more common under projected climate changes*
- *large tracts of conserved areas allowing plants and animals to migrate under changed climate regimes*
- *community participation programs in land management emphasising multiple use and multiple pressure planning*

XI. Identified Information and Assessment Gaps

[1 IPCC page]
This would be in the context of impacts, adaptation and mitigation options for climate change on biodiversity and the feedbacks for changes in biodiversity on climate change. Examples include: limited quantitative information on impacts of changes in biodiversity on climate change, impacts of geo-engineering options on biodiversity, impact of deep sea subduction and iron fertilisation on marine biodiversity.