

GEO-4/PAM-1/3 REVISED

GEO-4 COMPREHENSIVE CHAPTER OUTLINES

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ANNEX 1: CHAPTER 1 - Environment for Development
(based on Nanyuki group report)

1. Elements for Chapter One: ‘Context’ ...for 3 000 words (max. 10 pages with diagrams)

Plus key questions to be addressed in the chapter.

SUB-CHAPTER HEADINGS / Paragraphs	CONTENTS
Setting the scene... What is the international agenda toward sustainable development?	Hooks, attention grabbers... presenting a sense of opportunity rather than a problem (i.e. not the passé ‘20 yrs ago we noted and now should have...’). Brundtland et al and sustainable development in the context of millennium development goals implementation to 2015, WSSD+5 and CSD 08-09, agriculture, land, desertification.
Statement of goal... Statement of the aim and purpose of GEO 4	To inform decision makers... an opportunity to show how far we’ve traveled since 87...and present forward-looking policy options... This report is a tool towards achieving that. – provides opportunity to show decision makers and other stakeholders how far we have traveled, and where we might be headed, from an environmental perspective (from last sentence of 1 st para of revised storyline). GEO 4 aims to provide a comprehensive, scientifically credible, policy relevant, up to date assessment of, and outlook for the state of the global environment.
Scope...what is the overall essence of the assessment?	State of the world and regions (local-> regional ->global) past twenty years and looking forward to potential scenarios Also, from ‘Key Elements’ Focus on human well-being, prosperity, and vulnerability (interaction between society and environment)
Context... where do we stand in the evolution of ideas/progress, where are we going?	Evolution of sustainable development (see timeline diagram!), changing paradigm, MEAs, globalization, information technologies (WSIS), social/economic changes, the fact that environmental challenges have moved faster than institutional responses.
Methodology (taken to achieving GEO)... Questions: What is the value-added of GEO4 and its role in the global assessment landscape? What is new about the assessment process? Which overarching issues were given prominence in GEO-4? How does GEO-4 deal with the multi-dimensional aspect of the environment (i.e. examination of inter-linkages)? How does GEO-4 deal with the multi-scalar nature of the environment? (local-> regional ->global)	how was GEO developed (the GEO Participatory process) Plus science as a basis for SoE assessment, policy relevant, action oriented.... (Possible Links to Year Book – SoE, policy)
GEO-4 report structure.. how is the GEO-4 report organized?	Pluswhy was it done like this

SUB-CHAPTER HEADINGS / Paragraphs	CONTENTS
Who are the target audiences?	Primary groups: policymakers Secondary groups: NGOs, academics
Summary of findings (Overview paragraph)Short Overall summary. NOTE: WE CONSIDER THIS COULD BE A BOX DEPENDING ON WHETHER WE ARE SUPPOSED TO INCLUDE SoE IN THE INTRO (or whether it stands as a separate chapter)!
Perceived consequences of the findings	Recommendations will result in lessons learned, policies that work, challenges, opportunities, prospects for the future, and options for action/policy implications. NOTE: THIS SECTION COULD ALSO FEED IN TO INTRO TO STRUCTURE.

2. Process and Partnerships required developing the chapter

1) This chapter can be summarized based on the rest of the report, much of it can be written before the rest of the report is completed.

3. Opportunities and Synergies with other global and regional processes (assessment/policy)

1) Track developments over the next years through the GEO yearbook for possible synergies related to this chapter (e.g. Conference of MEA Parties, other assessments, policy analyses). Just to be sure the context section is pertinent!

ANNEX 2: CHAPTER 2 - Atmosphere

36 pages in all

Section 0 Executive Summary

2 pages

Should summarise Chapter 2, for people who may wish to get a flavour of what is in the chapter and promote the main messages (guidance needed).

Section 1 Introduction

1-2 pages

Outline major atmospheric issues including global warming and climate variability, stratospheric ozone depletion, POPs and methyl mercury, transboundary issues, urban air pollution and indoor air. The section will describe major impacts on human health, natural and agricultural ecosystems and heritage to explain why these are important and emphasise them in terms of environment for development (including targets and development goals in MDGs), including impact on socio-economic systems.

Describe emitted substances in terms of their residence times to bring out scale issues (the local, regional and global air pollution problems) from this and explain how the scale of the pollutant issues has increased with increasing scientific knowledge. We can also compare anthropogenic versus natural sources of atmospheric substances.

Introduce socio-economic driving forces including growth in population, urbanisation, globalisation, consumption patterns, energy, transportation and industrialisation and briefly explain how these have changed globally resulting in emissions.

Briefly outline that policy initiatives, targets (Brundtland, MDGs etc) and international cooperation (MEAs etc) have been initiated and resulted in successes in some areas but that much is left to be done.

Explain the goals and structure of the chapter.

Section 2 Driving forces

4-6 pages

Initially introduce driving forces as an issue for emissions differentiating between:

- *human-social dimension* (population, urbanisation, consumption (for basic needs vs luxury consumption);
- *economic dimension* (GDP, energy supply and demand, industrial production, transport demand and growth, demand for agricultural products)
- *spatial dimension* (planning, land use change, land management)

The section will build a story concentrating on key messages:

- Increasing population and per capita demand (consumption of goods and services, link to human behaviour) is leading to greater emissions
- Energy demand and structure of supply is a major cause of many emissions. Biomass fuel use in developing countries (with cultural influences) has disproportionate impacts on women and children.
- Transport demand and modes (relate to urban, choices) is key to urban, regional and global issues of AP and CC
- Urbanization is a combination of human and economic driving forces and is a key driver in LA, Asia and Africa
- Industrial production is responsible for many emissions
- Agricultural product demand and supply affects many emissions (CH₄, NH₃, NO_x, PM and POPs)

- Land use change (forest clearance by fire) leads to emissions of NO_x, PM and GHGs)
- Our economic structure as a driver that favours certain options, such as fossil fuel use by subsidies and thus drive our choices as there are no economic incentives to make any changes

In this section we will analyze and show for the key issues: trends, linkages (common drivers for different emissions), relate development to driving forces at a global and regional level giving appropriate examples from different regions (supplied by regions). We will also outline emerging issues such as trends in shipping and aviation.

Section 3 Air Pollution

8-10 Pages

This section will discuss AP in terms of state and trends in concentrations of different pollutant groupings:

- i. Common air pollutants (particulates, SO_x, NO_x, CO, VOC, O₃, NH_x, Fluorides)
- ii. Heavy metals (Pb, Cd, Hg, As etc)
- iii. POPs,
- iv. Other air toxics (e.g. PAHs, BTEX)

Examples of pollutant concentrations and deposition will be shown comparing the data for different scales (indoor, urban, peri-urban, regional, global patterns) showing trends and showing success stories (changes in emissions or levels).

Discuss emissions and specific drivers of emission development (drivers such as particular sectors, fuel type and quality, technology etc. that affect specific emissions of APs) and trends. This section will briefly outline atmospheric transport and transformation.

This section will discuss direct impacts of air pollutants such as impacts of gases/PM on human health and direct impacts on crops, forests and other ecosystems (CHECK with Ch 3 and 5), but not the secondary impacts (e.g. nitrogen impacts on terrestrial biodiversity or marine ecosystems CHECK with Ch 4 and 5), or bioaccumulation of methyl Hg and POPs in the marine food chain and humans CHECK with Ch 4). This section recognises the importance of secondary impacts and cross-references to other Chapters.

This section will discuss costs of inaction where appropriate (e.g. health impacts) in terms of impact (deaths) and monetisation (e.g. based upon DALYs) but not monetise cost of life or existence value of an ecosystem.

Discuss different regions in terms of their priorities (using boxes as examples, including issues such as indoor air pollution, haze, visibility, acid rain and ABC). Mention the state of knowledge of cause and effect in different regions.

This section will cross reference areas where air pollution impacts interact with climate change (synergistic/ additive impacts; changes in atmospheric processes). Noise is another example of an emerging issue especially from transport sector (mainly aviation and road transport) (CHECK with Ch 7 we propose to move noise there).

Session 4 Climate Change

6 Pages

This section will introduce the issue of climate change with reference to key Figures such as the observational record of atmospheric concentration of carbon dioxide, time dependence of climate change response to emissions and impacts as a function of temperature increase. It will then move to discuss emissions and warming, evidence for GW and impacts.

As for AP specific drivers of GHG emission (methane emissions, CO₂ from land use change etc) will be highlighted. There will be reference to the global situation and regional differences. The emissions will be

discussed in terms of substance characteristics and their effect on climate. The very long lived gases such as PFCs will be mentioned.

Global warming evidence will be based on an assessment of concentration data for different gases and discuss these in terms of temperature increase in the global mean surface temperature (with regional examples).

Direct impact of climate change will be outlined and cross-referenced to other chapters such as changes in polar caps, glacier changes, ocean surface temperature, decreases in THC (Thermal-Haline Circulation related to marine currents), changes in the Tropopause and permafrost. Regional issues related to climate variability (e.g. related to droughts) will be mentioned and cross-referenced. The linkages with AP could include the effect of sulfur aerosols, black carbon, tropospheric ozone, stratospheric ozone and soot on climate and weather pattern changes.

It is assumed that the indirect impact will mainly be dealt with other chapters, but that we could cover health impacts related to climate change (heat-wave, vector-borne diseases etc.). We may look at some other secondary impacts in as far as these are not covered in other chapters, such as floods and storms (and economic impacts due to these), sea-level rise and small island states as well as other regionally-specific issues (CROSS CHECK with Ch 3, 4, 5, 7,).

Section 5 Ozone Depletion

2 pages

The story will start by highlighting that the Montreal Protocol opened a new page in the International Environmental Governance (IEG), in its response to the scientific findings of ozone depletion. After that data on ODS consumption will be presented, followed by the state of the ozone layer and the resulting UVB radiation. Impacts related to UVB impacts on human health (esp in Latin America, Australia, New Zealand) and also the UVB impact on ecosystems and ecosystem services (for instance in polar regions) will be reviewed.

New developments worth mentioning include the extended and improved data collection and coordination in the monitoring of the ozone layer, evidence on the interlinkages between climate and stratospheric ozone, the identification of new substances with ozone depleting capacity as well as technical development concerning alternative substances.

The story will end with the challenges and opportunities (some of this may go to the response section of chapter 2, and some perhaps to other chapters as outlined below). The most important challenges lie now in the implementation of the Montreal Protocol. Issues may include illegal trade of ODS, MeBr, HCFCs, refrigeration and air-conditioning sector (increasing demand, many small scale users) and interlinkages with climate change. Opportunities that may be highlighted include strengthening regional cooperation, strengthening the IEG, technology development and civil society response (check with response section).

Section 6 Responses tackling emissions and impacts

6 pages

Introduce responses possible, outline that the actions at different scales relate to the scales of the problems and then move into the success stories, comparing and contrasting effectiveness and lessons learnt. In this section we need to decide on the key messages we will bring out and relate this to the drivers section and other sections.

Introduce response section in relation to two main approaches:

- Prevention and control of emissions, exposure to AP and options to reduce climate change (options of ways in managing emissions)
- Adaptation (adapting to the problems)

Discuss implementation at different scales of the above through:

- inter-governmental structures and MEAs (give some examples)

- policy action (e.g. setting targets, standards, command and control (regulation), use of instruments e.g. fiscal), or
- stakeholder responses (industry, communities, consumers), including awareness building (accepting change and behavioral change)
- Equity in responses (burden sharing, fairness)
- Barriers and opportunities to implementation (related, for example, in R&D in science and technology).

Effectiveness and efficiency of response in relation to (using case studies):

- Implementation of measures and agreements (e.g. compliance with regulation and quantitative objectives)
- Cost of implementation and of inaction (outline co-benefit issues)
- Scale of response in relation to the scale of the issue MEA, regional and local (subsidiarity principles).

Section 7 Conclusions

½-1 page

Need analysis in each paragraph (short and punchy take-home message avoiding complicating language) broadly follow the following:

- 1-2 paras on the problems leading to the issues (esp. energy, transport and consumption as driving forces leading to emissions of climate change and AP problems and ozone depletion)
- Few paras on the levels of pollution and impacts: Particulates and human health and CO₂ and implications (stark but well researched conclusions` - including regional trends)
- Preventing long-lived chemicals from emission (use of precautionary approach)
- Few paras on responses, lessons learnt: good news (e.g. ODS) and bad news stories (GHG) and to deal with these we must deal with the problems associated with energy and transport provision and consumption,
- Discuss the overall effectiveness and efficiency in realizing the goals and targets of Brundtland, MDGs etc in terms of promoting a healthy environment and progress in development

ANNEX 3: CHAPTER 3 - Land
Annotated Chapter 3 Outline

3.0 Main Points (1 page)

3.1 Context

- DPSIR structure in land context (Ref. Annex 1)
- Identification of environment & development agenda in Brundtland Report, example UNCCD
- Subsequent evolution of scientific understanding and perspective and evolution of political awareness:
 - ♦ New scientific data
 - ♦ Improved technology of data collection & information exchange
 - ♦ Global thinking
 - ♦ Increased data availability and handling capacity, but capacity to interpret and utilize is a constraint
- A new paradigm – joined-up thinking
- Present assessment of severity

3.2 Rapid Land Use Change and Unsustainable Management (*entry point*)

- Concept: main immediate driver and issue in its own right
- Indicators
- Evidence
- State & trends
- Main implications (Hooks to link with final IR section).
- Flags for climate change, biodiversity chapters

3.2.1 Forest and woodlands degradation/loss

- Concept
- Definition
- Topics
 - ♦ Forest use change
 - ♦ Afforestation – reforestation – deforestation; forest degradation; fragmentation
 - ♦ Impacts from disturbances (fire, pest outbreaks, insects, illegal logging, etc)
 - ♦ Impacts *from conversion*
- Implications, hooks to final IR section
- Flags for climate change and biodiversity chapters

3.3 Aspects of land degradation

3.3.1 Desertification

- Concept
- Definition
- Indicators
- Evidence
- Impacts / responses
- Hooks for *other groups and IR section*

3.3.2 *Erosion*

Conceptual model: processes, system resilience, short term – long term perspective, sustainability

- Definition
- Indicators
- Evidence
- Synthesis → geographical distributions, regional perspectives, desertification
- Hooks for other groups and IR section → link to productivity, ecosystem services & sustainability

3.3.3 *Nutrient Depletion*

- Concept, processes: insidious; links with erosion, organic matter loss, and biological activity; distinction between old tropical and young temperate soils
- Definition
- Indicators
- Response implications: fertilizer industry.
- Hooks to IR section

3.3.4 *Water scarcity and water quality*

Concept – green and blue water; source of freshwater; land management determines whether resource or hazard.

- Definitions
- Indicators
- Topics
 - ♦ water scarcity, quality and timing
 - ♦ rain fed cropping, pastoralism and forests
 - ♦ irrigation
 - ♦ urban
 - ♦ trans-basin/transboundary issues and consequences
 - ♦ erosion, sedimentation, floods, infrastructure, human health
 - ♦ non-conventional water resources
- Management responses, hooks to IR
- Flags for Water Chapter

3.3.5 *Salinity*

- Common section structure
- Topics
 - ♦ Natural and induced salinity
 - ♦ Effects on ecosystems function (forests, rangelands, agro-ecosystems)
 - ♦ Urban and industrial water supplies
 - ♦ Infrastructure
- *Management responses, hooks to IR (Why no improvement with all our experience?)*

3.4 **Contamination / Pollution**

Concept: economic activities as sources, point-source and non-point-source pollution, natural sources

- *Definition*
- *Indicators*
- *Evidence*

- *State and Trends: pervasive and progressive, impacts on biological systems, export to atmosphere and waters and food chains; waste management*
- *Management responses, hooks to IR*
- *Flags for other Chapters – water, air, marine & coastal, human health, biodiversity*

3.5 Perturbations of biologically mediated cycles

Concept: Loss of resilience of biological systems; change in capacity to maintain ecosystem services; evolution of scientific understanding

- *Definition*
- *Indicators*
- *Evidence*
- *State and Trends*
- *Topics*
 - ♦ *Soil biodiversity degradation*
 - ♦ *Critical loads considerations*
- *Management responses and hooks to IR*
- *Flags to climate change, air, biodiversity, water (freshwater & coastal)*

Assessment of quality of key data on land degradation

Assessment of costs of action and/or inaction

Implications in terms of policy

3.6 Outlook

Structure: DPSIR revisited; environment responses, political responses, economic responses

Topics

- *Issues of governance: direct/indirect; local/national/international*
- *Access to land resources (tenure)*
- *Gender aspects*
- *Effectiveness of existing policy frameworks: conventions*
- *Combating desertification*
- *Food and water security*
- *Reducing pollution and impacts*
- *Impacts of climatic change on land resources*
- *Twenty-year perspective since Brundtland, lessons, successes*
- *Black holes in data / knowledge*
- *So what?*

Flag scenario chapter

Floating (emerging) issues

- *Natural disasters (tsunamis, earthquakes, volcanic activity)*
- *Exacerbated disasters (landslides, floods, droughts, pestilence)*
- *Compaction and sealing*
- *Desertification – synthesis*

ANNEX 4: CHAPTER 4 - Water

Total number of pages = approx. 40

Executive summary (2 pp)

4.1. Introduction (1 pp)

- Principles of water as an integrating medium – connectivity in the basin context, ecosystem approach, hydrological cycle – ‘blue and green water’ etc
- Overview to humans of the main issues in the water environment; introduce six key state issues
- Overview of the resources: the water environment as a continuum – catchment to ocean with atmospheric exchange
- Freshwater resources and ecosystem services – surface water, groundwater, ice including permafrost
- Marine and coastal resources and ecosystem services
- Drinking water and sanitation; irrigation, hydropower, industry; ecosystem support (terrestrial and marine ecosystems including coastal)
- Statement of water related threats to human populations eg floods, drought, coastal erosion, coastal inundation
- Refer to Dublin principles, World Water Forum 2 etc.
- Note functional definitions of “coastal” and “marine”: coastal refers to issues relating to strong land-sea introductions
- Note importance of capacity building as overarching issue; refer to Chapter 8
- Flag five key themes: Food security, Human health, Human safety/security, Water supply, Socioeconomic development and livelihoods.

4.2. State and trends of the water environment (10 - X)

Statement on resources and how they are changing with links to policy as relevant – address quantities and qualities, eg pollution levels.

4.2.1 Global Overview –

- Major state and trends over last 20 years in order of priority
- Mention major agreements/initiatives, (e.g. GPA, IWRM) and interlinkages
- State of knowledge of water ecosystem services
- Lack of global guidelines and standards for monitoring and assessment
- Lack of reliable data / knowledge
- Make reference to the MDGs (incl. 2010 Biodiversity Target) – are we on schedule?
- Five priority state issues: Pollution, Water Scarcity, Fisheries Depletion, Ecosystem modification, Disturbance of the hydrological regime

4.2.2 Inland waters

- State and trends of inland waters (groundwater, surface water, ice)
- Change in flow and dynamics
- Fisheries
- Competing water use demands
- Water supply and sanitation
- Biodiversity.

4.2.3 Coastal areas

- State and trends of coastal ecosystems
- Coastal eutrophication
- Sediment flows
- Pollution and depletion of coastal groundwater;
- overfishing; changes in species composition and maturity, increase in pollution - solid waste, agrichemicals, industrial, domestic, mining; oil;
- Threatened and endangered species; sea level rise; hydrocarbon exploitation.

4.2.4 Marine areas

- State and trends of marine ecosystems
- Fisheries
- Feedbacks to climate; thresholds
- Phase shifts in food webs
- Changes in dust fallout
- Nitrogen input
- Climate change
- Hypoxic areas (“dead zones”)

4.3 Drivers of change / pressures and environmental impacts (5)

4.3.1 Indirect drivers/root causes

- Education (lack of) leading to lack of social responsibility
- Socio-cultural institutions [to be defined]
- Demography/migration
- Poverty and public health
- Poverty and unsustainable exploitation of resources
- Distribution patterns (uneven population distribution x water availability)
- Inadequate human capacity, knowledge and available data
- Resources allocation: prices, market, trade, perverse subsidies, incentives ownership and common property
- Production and consumption
- Political framework (how the game is played); bad governance: pickup signals, balance interests, execute decisions, different conflicts among different water uses and sectoral; lack of law enforcement especially in developing countries
- Sectoralization of institutions dealing with water planning and management (conflicts of interest); [link to governance section]
- Conflicts and political instability – i.e. within the context of catchments (allocation); war and impacts on water resources;
- Technological options and innovation
- Globalization – transboundary movement of everything.

[Note: Crosslink to chapter 1]

4.3.2 Pressures (Direct drivers)

Inland (basin)

- Climate change / variability
- Agriculture

- Water use and provision [capture issues of trade-offs among sectors and environmental implications, groundwater exploitation]
- Land use change
- Alteration of hydrological regime and associated hydraulic infrastructure
- Urbanization and industry
- Groundwater
- Capture fisheries [subsistence, artisanal, industrial]
- Aquaculture [extensive, intensive]
- Invasive species [link to interbasin transfers of water]
- Energy [hydropower]
- Transport
- Human conflict

Coastal (revisit based on functional definition)

- Climate change
- Natural disasters [tsunami, storm surges]
- Urban development, industry
- Tourism
- Water use
- Pressures from human activities in catchments
- Aquaculture Invasive species
- Over-exploitation of resources (living and non-living)
- Destructive fishing practices

Marine

- Climate change
- Energy
- Over-exploitation of living resources (also capture agriculture as indirect driver)
- Destructive fishing practices
- Marine transport [oil pollution, solid waste, alien species]
- Resource extraction (oil platforms)
- Land transport [nitrogen, CO₂]
- Industry [impact of radioactive waste on seafood]
- Land use/desertification [dust issue – eutrophication, diseases]

Possible box: cumulative impacts on coral reefs (bleaching, fisheries impacts (overfishing, physical), pollution, sedimentation, eutrophication); synergies; possible freshwater example.

4.4 Impacts on Human Well-being and Development (10 pp)

- Linkage of environmental impacts to provision of ecosystem services Trade-offs among ecosystem services (healthy ecosystems=healthy humans);
- Link to MDGs: specifically Goals 1, 6, and 7;
- Perhaps put \$\$ on impacts (i.e. total costs and benefits of damming as a case study; controlling floods versus flood benefits);
- Resource economics – pricing of ecosystem services; valuation methodologies (monetary and non-monetary).

Human health

- Hazardous waste and industrial wastewater links to toxicity/cancer/chronic illness
- Urban wastewater and lack of sanitation links to water borne disease
- Nitrate pollution in freshwaters links to harmful to children

- Contamination of drinking water
- Harmful algal blooms
- Food contamination

Water availability

- Physical scarcity
- Draw-down of groundwater tables for competing water needs, surface water withdrawal, and dams leads to water shortage and water conflicts
- availability of clean water resources
- lack of access, and supply to water users

Food security

- Salinization and loss of productive soils due to irrigation (vulnerable: semi-arid)
- Loss of productive soils due to erosion (refer to land chapter)
- Direct over exploitation of fisheries
- Effects of ecosystem degradation and loss of fisheries, reduced crop production
- Benefits to local communities

Human Safety and Security

- Loss of flood control
- Dams and levees
- Loss of storm protection due to coastal habitat loss (vulnerable: coastal populations)
- Responses to drought

Socioeconomic Development and Livelihoods

- Loss of riparian areas due to channel erosion resulting from increased peak discharge from impervious cover
- Coastline vulnerability, erosion of coastal zone due to dams upstream and sediment reduction to coastal zone
- Direct loss due to damming (i.e. China)
- Inundation of coastal cities/small islands
- Loss of infrastructure (flooding etc.)
- Suspended sediment in freshwaters due to erosion links to more expensive drinking water treatment
- Algal blooms due to eutrophication
- Coral habitat loss due to climate change and pollution
- Collapse of fisheries leads to split families in order to find inland work
- Trade-offs; impacts on other options for livelihood.

4.5 Responses and Interventions (5 pp)

Key question: What has been the effectiveness of governance and other interventions in relation to water since Brundtland, and where are there gaps and weaknesses, and opportunities?

4.5.1 Introduction

Existing frameworks for water resources management and emerging issues

Law: International agreements relating to water management

Policy: International water policy including Dublin Statement, Agenda 21, Bonn Recommendations, Hague Declaration, Kyoto Declaration, J'burg Declaration, work of UN CSD, GWP, WWC, etc. Identify key issues including streamlining policies, resource allocation, private sector participation, accountability and transparency, ICZM, IWRM or IRBM.

Institutions & organisations: International institutions and organisations involved in water resource management at local, national, and international levels including science and the private sector, cross-sectoral linkages.

Knowledge

- Science and Technology
- Monitoring and evaluation (adaptive management)
- Traditional and local knowledge (e.g. Kakadu water calendar)

Financing mechanisms and incentives

- Incentives, deterrents, pricing and markets, Corruption, Private sector, Certification

4.6 Cross-cutting issues (2 pp)

4.7. Emerging issues (possible)(2 pp)

- Bioprospecting rights and other property rights on the high seas
- Phase shifts, feedback loops, thresholds
- Trade-offs
- Wastewater re-use in agriculture: environment and health implications
- Shift from food production in agriculture to biofuel

4.8 References

 ANNEX 5: CHAPTER 5 - Biodiversity
Main messages**(1 page)**

The most important (up to) 10 key messages to come from the chapter – on the state and trends of biodiversity, headlines from the selected themes, synthesis of regional biodiversity issues, and on policy options.

Part I – Introduction and Overview of Global Biodiversity**1. Introduction to the chapter**

(1-2 pages) LAs: Nevill Ash & Kaveh Zahedi; CAs: all of group

a) Biodiversity for sustainable development

Biodiversity is the very basis of life, *it is a key pillar for sustainable development and the alleviation of poverty*, and our future. It provides the foods and medicines we need, the fiber of our clothes and the building blocks of our houses. These values and functions of biodiversity are easy to understand, but there are many unseen and undervalued functions of biodiversity which are as, or more, important. From the microbes that digest waste and clean our water, the organisms that provide pollination services for plants, to the glory of the forests for cultural sustenance, it is the biodiversity of this planet that provides the primary production of the planet that humans transform in the development process.

Sustainable development is about the future. It is about ensuring that the actions to bring about the well being of people today do not jeopardize the well being of future generations. If future concerns are not taken into account and the products and services that are provided by biodiversity are not protected and managed effectively, future development scenarios will have to expend enormous amounts of money to replace the “free” services of nature, if indeed they can be replaced (get Pimental or other citations and data).

When biodiversity is lost, it is effectively lost forever. The possible cures for AIDS or cancer, the new chemicals needed for the next generation of efficient energy production or the molecular structure for a new super material are likely to come from or be inspired by biodiversity and its components.

Biodiversity is everywhere, and much of it cannot be seen by the naked eye. Some of it is dangerous to humans. Its very ubiquitousness and human ingenuity have both created conditions where we try to control and undervalue biodiversity. We can replace fibers and wood with polymers and steel for our clothes and houses. We can kill insects and pests. But unseen does not mean unimportant. And replaced does not mean not-needed. Contemporary production processes have produced waste and pollution that will need us to understand and utilize biodiversity in new and novel ways. (Put in sentence about microbial anticontamination processes) But we can only use the biodiversity that exists. For both future options and effective adaptation for changes in the environment, we will need to utilize the fullest range of biodiversity.

Our challenge is getting the values right—cultural, economic, and social—so that the biodiversity of today is available for the generations of the future. This is easier said than done. Biodiversity management and policy impact all sectors of society, have strong cross-cultural and cross-boundary implications. And as the discussions on access and benefit-sharing, one of the prime pillars of the UN Convention on Biological Diversity, are showing, the issues of providing greater value are not simple and will take research, imagination, and good will to sort through.

In this chapter, we will briefly examine the status and trends of biodiversity—generally acknowledged to be in a new, human-induced crisis of decline and extinctions—and review the current and potential uses of

biodiversity and the novel and innovative attempts to increase the values that individuals, society, the market and the international system place on biodiversity.

--add link to marine and atmosphere.

b) Overview of biodiversity in the international context

From Brundtland report to Rio to Jo'burg and beyond. Historical review of biodiversity in the global context. WEHAB. 2010. MDGs.

c) What the chapter will contribute to the debate on “biodiversity for sustainable development”

Added value of chapter. Build on MA, regional GEO reports (eg African Environment Outlook, GEO Latin America etc.) and other sources (not duplicate). Red lines: people and human well-being (material and non-material), valuation and natural capital analysis. Relevance for policy makers.

d) What the chapter will cover and its layout.

- i.) What is the **current state of knowledge regarding the environmental challenges and emerging issues relating to biodiversity**?
- ii.) What are the current **internationally agreed biophysical, institutional and governance goals, targets and standards for environmental governance** relating to the major environmental challenges and what indicators and data are available to measure progress towards them?
- iii.) What are the **current status of and trends in environmental change and the interaction between environment and society** seen in relation to the internationally agreed environmental goals and targets? (Ben focus)
- iv.) What are the **drivers of environmental change** and alterations in environmental services, how do they affect human well-being and prosperity, and which groups, ecosystems and geographical areas are vulnerable to change?
- v.) How is the **environment contributing to the implementation of the internationally agreed development goals**, including those contained in the Millennium Declaration, in areas such as human health, food security, poverty alleviation, energy and disaster-preparedness? (Ben focus)
- vi.) What **policies are in place and what action is being taken**? How effective are the responses by governments, civil society and international organisations and what are the consequences of inaction?
- vii.) What are the **emerging issues at global and regional levels which may have significant impact on human and/or ecosystem health**? What has been the progress in following up on these emerging issues highlighted in previous GEO reports, and year books?
- viii.) How has the **environment been a key factor for development**. (Marco—move up, maybe first)

2. Global overview of the state and trends of biodiversity

(4-5 pages) LAs: Jonathan Baillie and Georgina Mace, CAs: Ben

- a. Brief summary of the state and trends of global biodiversity (ecosystems, species, populations, and genes and/or nations, regional seas, watershed, biome/ecoregion, as appropriate to the issue and data. Highlight available non-vertebrate data. Possibly add information on the state of conservation. (Questions of lag and lead times?) Present (progress towards) the 2010 biodiversity indicators. Highlight any new global indicators. (Work with chapter 9 people).
- b. Introduce the links between biodiversity and the provision of ecosystem services. Highlight a number of ecosystem services that play a role in sustainable development (e.g. medicinal species, fisheries, forest products, bushmeat) and present trends in these services. Key issues—loss of biodiversity, current use of biodiversity (agriculture, health, water purification, cultural...), potential uses of biodiversity (bioprospecting in marine and terrestrial areas).

3. Drivers of change in biodiversity

(2-3 pages) LAs: Jonathan Baillie and

- a. Introduction to the notion of and trends in drivers and pressures.
- b. Overview of indirect drivers (focus on population, consumption,). Can we add undervaluation?
- c. Overview of pressures. Graphically summarise the trends over last 20 years in direct drivers (e.g. deforestation, land conversion, expanding infrastructure, bushmeat, fisheries, climate change, competition for resources (water)). Also provide a few regional case studies (e.g. introduced species/disease).
- d. The complex interactions of pressures and potential implications (with a focus on climate change and invasive species/fire/disease).
- e. Preservation/restoration of coastal mangroves, sea grasses, and reef systems.
- f. Using the example of economic growth as an indirect driver, this chain will be explored to show both negative and positive effects on biodiversity. Value of biodiversity (internalisation of, natural capital). Patterns of growth and consumption. Examples will be given such as a case study of deforestation in Cameroon: economic growth in industrial countries leading to depletion of local forest and fisheries reserves, elevated price of hardwood, and finally demand for hardwoods in Cameroon. Also success stories - economic growth leading to investment in protected area systems and substitutes for biological products which has led to reduced exploitation.

Part II – Selected Themes in Biodiversity

4. Integrative overview (1 page)

This section will develop 4-5 key themes, tracing the entire DPSIR framework to show the role of biodiversity in supporting sustainable development and human well-being, through ecosystem services. It will include an assessment of key policies that have been implemented relating to each of these themes.

The material in this section will focus on new and innovative issues where data and information available – including improved valuation of biodiversity and ecosystem services, and economic opportunities. Differential impacts will be highlighted (eg on urban and rural dwellers)

The five themes selected for development are:

- Biodiversity and Health
- Biodiversity and Agriculture
- Biodiversity and Materials and Energy
- Biodiversity and Security
- Biodiversity and Cultural Values

5. Biodiversity and Health

(3-5 pages) LAs:

Issue	Ecosystem Services through which people are affected by biodiversity changes			
	Provisioning	Regulating	Cultural	Supporting
Health	Medicines Nutrition Recreation	Purifies water, air and waste Entire ecosystem to protect infections/controls, predators/vectors Provides vectors Provides biological control for vectors	Recreation Medicines Nutrition Mental/spiritual	Nutrients cycling Oxygen, Carbon dioxide, water cycle

- Biodiversity is used in health (research \$ values, quantity of species used, quantity of people helped, variety of species used and types of people helped) and helps create conditions needed for human and environmental health (air and water purification, etc)
- Biotechnology used in health to provide medicines including hormones and nutrition. (Research \$ values, variety of species used, quantity of medicines produced)
- WHO now has policy and data on use of traditional medicines in medical treatments
- Traditional medicines treatment is now being formalized as alternative medicines—use South Africa example
- Latest developments in use of plant extract (Text Box : artemisin from Artemesia plant, most powerful treatment for malaria)
- Some possible texts to check : “Conservation and utilization of indigenous medicinal plants and wild relatives of food crops” UNESCO and “ Development through plant biotechnology” UNESCO
- Commercialisation of dried products from NTFP. Check statistics from ICRAF on tree components, plants/animals used.

Impacts

Increase in infectious diseases and creation of emerging diseases
Increase in malnutrition and related diseases
Loss of potential cures for diseases
Decrease in human productivity resulting in decrease in a country’s GDP
Loss of a variety of species which variety could aid in mental and spiritual health
Poorer holistic health, that is mentally, physically, spiritually
Loss of cultural practices and traditional knowledge
Stress filled society
Decrease in nutritional quality
Decrease in water and air quality
Increase in respiratory diseases
Possible increase in kidney disease sufferers (lack of water)
Increase in heat stroke and climate related diseases
Increase in waterborne diseases

Graphics, data to support above

Drivers And Pressures

Unsustainable use/overpopulation/ unregulated access and inequitable benefit sharing
[Text box : Prunus africana, good for prostate cancer and problems with its overuse)
Poor valuation/undervaluation of species/lack of awareness of the dynamics of their interactions naturally
Increase in invasive species
Climate Change
Land transformation/unregulated land use
Loss of traditional knowledge

Responses

WHO Policy on traditional medicines
Examine undervaluation of current and potential uses of biodiversity for human and environmental health
Adopt proper policy and legislation to regulate/formalize use of traditional medicine
Development, implementation/enforcement of land use policy
Increased research/domestication on biodiversity and its importance to health
Policy on access and benefit sharing, bioprospecting
Promote ex-situ and in-situ facilities
Use/promote biotechnology capacities for R&D/Investments
Wide publicity for success stories needed regularly on use of biodiversity and health

6. **Biodiversity and Agriculture**

(3-5 pages)

Issue	Ecosystem Services through which people are affected by biodiversity changes			
	Provisioning	Regulating	Cultural	Supporting
Agriculture and food (biotechnology)	Medicines, nutrition (raw materials or genetic varieties) Food crop varieties Fibres Ornamentals (plants, animals, pets) Improved varieties and yields Pest resistance	Biological control Soil conservation Water conservation Use Text box from Malaysia's example of soil biodiversity	Ceremonial, taboo, folklore	

- Biodiversity is the basis of agriculture. Cultivated species become food. [Check no. of species globally used or food. Main crops used]
- Many wild varieties, land races earlier used in agriculture are rapidly disappearing including the knowledge of the use of them. [Show areas covered by crops showing change in land used or crops]
- Rural /urban migration in some places with scarcity of labour for land in others..
- Conversion of agricultural land into urban areas and other uses.
- Rapid rate of forest loss means less species and germplasm available to be used as food.
- Monoculture in crops, decreased variety in animal breeds, aquaculture questions (increased yield vs. vulnerability questions).
- GMOs used to improve yield, pest resistance and resilience. [Get statistics and graphics]
- Growing concerns about the impact of GMOs contaminating native species and also on health [Get statistics and graphics]
- Agriculture dependent on very narrow base of plant and animal species.
- Increased use of agrochemicals affecting biodiversity.
- Change in biodiversity, causing/contributing to change in climate resulting in change in agricultural patterns such as flowering patterns etc, plant tolerance to droughts, change in rainfall patterns affecting agriculture
- Climate change causes increase in pests and plant and animal diseases
- Hunting and wildlife food source becoming threatened because of commercialization of wildlife through hunting for export markets.

Impacts

Increase in acreage of land required
 Encroachment on fragile ecosystems and protected areas
 Genetic erosion
 Intensified pressure on land use
 Soil erosion, loss of nutrients
 Marine and coastal ecosystems adversely impacted
 Adverse impacts on mechanization on land
 Increased water run off
 Adverse impacts on dams/siltation etc
 Less hydropower generation
 Less fresh water supplies

Livelihoods affected [Pygmies, Congo Basin Forest unregulated /illegal hunting]
Loss of biodiversity and traditional use of food
Risks associated with consumption of food illegally hunted

Pressures

Demand for more land
Demand for improved varieties
Increased diseases
Increased pressure on urban areas/substandard human settlements
Increased demand for water
Unsustainable livelihoods
Development of new patterns of consumption of traditional foods
Demand for non traditional crops
Increased need for agrochemicals to fertilise soils and improve crop yields
Introduction of new species including alien invasive species [Research Lake Victoria/Nile Patch] [Research Sugar Project/Policy failure]

Responses

Global (in parts)
Enforcement and compliance mechanisms for commercial exploitation
Enforcement and compliance with MEAs
Legislative and policy measures
Sturgeon fish and caviar recovery (Cooperation between CITES, CMS and reg'l MEAs)
Promotion of positive incentives including ABS modalities (International markets can help manage species sustainably)
Improve land management [Cross check with Land Chapter]
R&D especially wrt value addedness of local biodiversity [Research South Africa exporting teas to Japan with lucrative results]
Opportunities for sales and entrepreneurship using local biodiversity – pathway to prosperity.

7. Biodiversity and Materials and Energy
(3-5 pages) To be elaborated

8. Biodiversity and Environment (and Livelihood) Security (3-5 pages)

This section will highlight the role that biodiversity has played in providing security for people. It will be most focused on natural disasters and has linkages to the “biodiversity and health”, “biodiversity and agriculture” and “climate change” and “land degradation” and the water sections. It would include analysis of biodiversity loss as a contributing cause of natural disasters and its consequences for human well-being. The section will reflect both impact of biodiversity loss on natural disasters and security of people.

1. Introduction to the section

Key messages on issue

2. State and trends

What types of security are provided by biodiversity (health security, food security, water security, physical security) and how (absorption and production of water, absorption of CO₂, purification of water and air, strengthening of slopes, river banks, etc). Not to duplicate other sections focussing on services such as health, water, etc.

3. Pressures

Main pressures on biodiversity that lead to the decreasing of security services – direct and indirect – (deforestation, habitat fragmentation, overexploitation, *Climate Change*, public unawareness, etc.)

4. Impacts

- How the biodiversity loss impacts on security services: increasing number of diseases, Natural disasters – floods, landslides, mudflows, through the climate change – droughts, tornados, fires, storm surge
- How the Natural disasters affect on the state of biodiversity
- Consequences for human well-being: number of casualties, economic losses, social and cultural impacts
- Invasive species

5. Conclusions and linkage to policy options

9: Biodiversity and Cultural Values

LA: Luisa Maffi CAS: Leonard Hirsch,

1. The problem:

Humans' loss of sense of interconnectedness with the environment.

Because people don't feel connected with the nature around them they do not take into account the effects of their behavior on nature in their daily activities and decisions. This leads to a kind of tragedy of the commons on an individual basis - the tyranny of small decisions.

2. Framework:

Behavior, including behavior vis-à-vis the environment, is governed by cultural beliefs, values and knowledge. Different beliefs, values, and knowledge affect whether the use and management of the environment is or is not sustainable.

[Knowledge, Ethics and values, Beliefs] -> Culture -> Social behavior/lifestyle -> Depletion or conservation of biodiversity, intergenerational transmission of knowledge and use.

[Ecosystem peoples vs. biosphere peoples]

Need to analyze the change over time in the beliefs, values and knowledge of various groups of people (eg. traditional rural groups, urban people, immigrants and refugees) and how this in turn affects their relationship with the environment.

Wastefulness, not seeing impacts.

3. Historical analysis of persistence and loss of interconnectedness with examples:

a) Rural people

Directly receiving their goods and services from the immediate environment. Cultural beliefs, values, knowledge support perception of dependence on nature for human well-being, need for caring and stewardship, non-material valuation of resources and restraint in their use. Changes due to shift toward dominant culture begin to break down transmission of traditional beliefs, values, and knowledge, leading to more material, consumptive, wasteful behaviors. Degradation of environment in turn negatively affects their well-being.

b) Urban people

The center drawing resources from the periphery; urban people more and more remote from the sources of their subsistence and less and less aware of their dependence on the environment for their well being and thus of the environmental consequences of their behaviors. Beliefs and values support material, consumptive, wasteful behavior and unsustainable use of resources. Knowledge of environment and environmental processes diminishes or is abstract, with no direct relevance to lifestyle. The long-term negative consequences for human well-being increase exponentially.

...periurban—closer to, but also impacted more by biodiversity.

c) *Migrants, refugees*

People moving to a new environment due to economic reasons or conflict may behave in ways that are destructive of their new environment, because of lack of long-term knowledge of the new environment and other circumstances leading to radical changes in behavior.

d) Poverty as a driver

Rural using biodiversity beyond carrying capacity, and needs to feed urban poor leading to keeping prices low.

4. Implications of these historical processes for environment, sustainable development, and human well-being:

Analysis of what happens if we do not do anything about it (using existing data and/or scenarios).

5. Response options:

Analysis of what is and can be done about it (policies, education, capacity-building, on-the-ground action). Indicators—cultural indicators, growth of fair trade/organic/bird-friendly organic markets. Possible box on coffee.

Part III –Synthesis

10. Regional Synthesis

(3-4 pages--tbd)

This section will synthesise from the across the regional biodiversity issues to provide a narrative on where there are differences between the regions, and regional differences to global trends. The section will also highlight those regional biodiversity issues that are of particular global significance. It will draw from the biodiversity assessments and regional experts from the seven GEO regions, and also include a focus on other key areas and systems, such as islands, and urban systems.

11. Policy options

(4-5 pages) LA: Leonard Hirsch

This section will include an assessment of policy options, based on a synthesis of the previous material in this chapter, including a focus on success stories, improving the valuation of biodiversity, and Protected Areas.

1. Key Messages

- a) Getting the values right.
- b) Local level impacts are key and additive

2. Governance

- a) The nature of biodiversity—everywhere, dispersed, undervalued
- b) The proliferation of authority units—from land holder, through community and political jurisdictions through the MEAs.
 - i. Lack of capacity
 - ii. Coordination problems—local to national, inter-ministerial, regional and international
 - iii. Widespread stakeholder involvement...or not. (Stakeholder vs. rightsholder)
- c) Conflict between local use, sharing of benefits, national jurisdiction, cross-boundary ranges (look for ASEAN discussion on this), international use (trade and commercialization of genetic resource).

- d) Unmet expectations of benefit sharing
 - e) Unclear relations with indigenous communities
 - i. Text box on US NIH bioprospecting—comparison between experiences in Peru and Mexico
 - f) Corporate responsibility
 - g) Synergies and disjunctures between the MEAs—CBD, CITES, CCD, Ramsar, CMS, WHC, UNFCCC (streamlining and/or assigning shares of work)
 - i. Mechanisms for compliance
 - ii. Text box on CDM projects and biodiversity
- 3. Policy development and implementation**
- a) Market failures, failures of information (science based policies), and administrative stovepiping
 - b) Regulatory frameworks
 - i. Financial/tax structures
 - ii. Regulations
 - c) Conservation
 - i. Protected areas/limiting access
 - ii. Conservation units/ecosystem approach
 - iii. Quotas and supply restriction
 - iv. Markets for quotas and easements
 - v. Preservation/restoration of coastal mangroves, sea grasses, and reef systems.
 - d) Sustainable use
 - i. Tourism
 - ii. Fisheries failures
 - iii. Medicinals
 - iv. Compliance and enforcement programs
 - v. Local, national, MEA?
 - vi. Alternatives development
 - e) National implementation within global markets—benefit sharing
 - f) Global implementation
 - i. Implementation of global programs of work
 - ii. Tech transfer and financing
 - g) Valuation of goods and services and recent attempts to reduce perverse incentives (subsidies and infrastructure impacts) and create markets or payment programs to increase incentives for conservation and protection of biodiversity and ecosystems.
 - h) Integration of biodiversity concerns in sectoral policy (from MA)
 - i. Text box on PRORENA in Panama
 - i) Technology, tech transfer
 - j) Education and public awareness
 - i. Public participation
 - k) Capacity
- 4. Next steps**
- a) Actions for policy and decision makers
 - b) Evaluation of valuation programs and further development.
 - c) Green accounting (national), triple bottom line (corporate)

- d) mechanisms. Research on sustainable use and compliance
- e) Research on the impact and effectiveness of the MEAs.
- f) Capacity building
- g)

Part IV – Conclusions and emerging issues

(3-4 pages)

Conclusions

This section will briefly summarise key findings and cross-cutting issues of the chapter (but may end up being cut as the executive summary is developed)

Gaps in knowledge

That have hindered our ability to assess the issues

Emerging issues

Highlight future challenges relating to biodiversity.

ANNEX 6: CHAPTER 6 - Regional Perspectives

AFRICA

Africa Region - Land Degradation

- The chapter will underscore the Land degradation issue, and the initiatives in combating it.
- It will place the human being at the centre of the issue.
- Emphasis will be put on *what should and can be done with existing (remaining) land asset*, rather than focusing on what has been (already) lost.
-

Land Degradation

The following will particularly be illustrated:

- *adding value* to the land resource that is not degraded;
- *using land resources efficiently* (and sustainably) to derive *maximum benefit*;
- making a case for *safeguarding and improving* the undegraded land asset

Land Degradation

- Introduction
- Justification for selecting land degradation;
- Land as a factor for production, wealth and status
- Inventory
- Forests and woodlands, arable land, soils, wetlands, mountains, deserts, antarctic [AFRICA'S MAJOR LAND FEATURES MAP]
- Opportunities for development
- Agriculture and food security; development of settlements and infrastructure;
- mining and oil extraction; tourism and recreation; etc

Land Degradation

- State and trends
- Extent of land degradation with examples in boxes (desertification, soil erosion, salinization, deforestation, habitat and species loss, etc) [DEFORESTATION TRENDS DATA]
- Drivers and Pressures
- Climate variability and change, poverty, technology, policies and legislation (governance), demographics, trade and markets, armed conflict, invasive alien species, HIV/AIDS and disease, etc

Land Degradation

- Impacts
- Food security [FOOD PRODUCTION INDEX TRENDS], poverty, water quality and quantity, habitat and biodiversity loss, coastal erosion, deforestation
- Responses
- Institutions, policies etc to enhance Africa's land resources value (NEPAD, UNCCD, Sub-regional initiatives).

Land Degradation

- Opportunities and challenges

Asia and the Pacific Region

I. Introduction

(background: description of characteristics UNIQUE for A & P) == 1 pages/500 words

- Population growth (size/density/growth rate/average age/literacy levels/gender) :
Urbanization (% people living in cities/total no of population)
- Economic diversity (GDP/per capita/poverty/economic growth rate/employment)

II. Issues

- Local transport and energy production challenge
- Balancing water resources and demands
- Alleviating pressures on precious ecosystems
- Land conservation opportunities
- Controlling consumption developments

A. Short description (All of issues) (Intro)= Focus (300 words)

B. Per Issue (4,500 words = 900 words/issue)

- “Environment for development” (Label)
- DPSIR –Elements (short)
- Inter-linkages with other issues (for DPSI) R ?
- State & Trends for State (always) Impact & Pressure (where possible)
- Response : Enabling per-requisites (i.e. governance, education/capacity/awareness)
- Response: Holistic solution
- Climate proofing
- Poverty alleviation
- Gender issues
- Sustainability
- Include regions involved
- Global implications

III. Conclusion

- Conclusion and summary (700 words)

1. Introduction

The following 5 issues will be assessed in detail for Asia & Pacific in this chapter:

1. Local transport and energy production challenge

Population growth and economical development, together with continuing increase in urbanization, puts a high pressure on transport and energy-production. This causes a increase in air pollution, deteriorating the air quality in mainly the urban areas. However, this cause-effect challenge also offers opportunities for directly intervening in the transport and energy sector (eg. with technological solutions, public transport) to improve the situation.

2. Balancing water resources and demands

Population growth and economical growth increase the demand for (good quality) water (both for drinking and for irrigation), while at the same time put a polluting pressure on the water resource. At the same time, climate change in some areas is negatively influencing the amount of available water, threatening the long term sustainability. This asks for a careful balancing between demand and availability on the one hand and protection of water resources (eg. against pollution) on the other hand.

3. Alleviating pressures on precious ecosystems

Growth in tourism, as well as agriculture, fisheries, forestry, industry, urbanized areas (resulting from population growth and economical growth) put pressure on many ecosystems (showing in eg. biodiversity), which at the same time are providing the services that are enabling these functions. The maximum sustainable capacity of these systems as about to be reached, or in many cases is already exceeded. It is possible to formulate solutions for alleviating the pressure on the ecosystems, making the dependency-relationship more direct, like ecotourism.

4. Land conservation opportunities

Land degradation is occurring on many levels (salinisation, erosion, desertification) and directly threatening the many important services of the systems involved (including agriculture and forestry). Solutions must look for opportunities to maintain and enhance the systems under threat.

5. Controlling consumption developments

The ever increasing stream of solid and liquid wastes resulting from a wide range of human activities, require a careful management of these wastes. This can be direct (by selecting the best way to reduce the wastes), but also indirect, by managing the activities that are causing the wastes. Better packaging, recycling and consumption patterns all offer opportunities for doing this.

2. Issues

Issue 1: Local Transport & Energy Challenge

DPSIR

Driving Forces	Pressure	State	Impact	Response
economical and population growth; urbanization; industrialization	increase in emissions from local transport and energy production	URBAN AIR QUALITY	human health	fuel pricing, clean technology, urban planning

Inter-linkages

	D	P	S	I
1	X	X	X	X
2	X	X		X
3	X	X		
4	X			X
5	X			

States and trends

S	Urban Air Quality (concentration SPM: suspended particulate matter)
I	Human Health (#Respiratory Diseases) Health Costs (\$; universal indicator)
P	Emissions (CO/NOx/O3/SPM)

Responses

Prerequisites

Good Governance (by Government and Industry)
 Awareness and Capacity

Opportunities

Climate proofing : contributes to mitigation
 Poverty Alleviation : offer alternative heating options (health)
 Gender : ?

Sub-regions involved

Aus/NZ	CA	NE	S	SE	SP
		X	X	X	

Comment [U1]: Eventually a priority over the regions will be indicated

Issue 2: Balancing Water Resource & Demands

DPSIR

Driving Forces	Pressure	State	Impact	Response
economical and population growth; industrialization; climate change and variability	(industrial) pollution; increase in water demand; change in hydrological cycle; land use change	QUALITY AND AVAILABILITY OF WATER	Land degradation; human health, ecosystem services; agricultural production (food security); hydropower; cross boundary issues	technology; water conservation; IWRM

Inter-linkages

	D	P	S	I
1	X			X
2	X	X	X	X
3	X	X		X
4	X	X		X
5	X			X

States and trends

S	Access to safe water (#)
I	Water related diseases (%)
P	Water quality (Coli forms)

Responses

Prerequisites

Good Governance (by Government and Industry)
 Awareness, Education and Capacity

Opportunities

Climate proofing : adaptation: rainwater collection
 Poverty Alleviation : improve access to water; improve sanitation
 Gender : improve access to water

Sub-regions involved

Aus/NZ	CA	NE	S	SE	SP
X	X	X	X	X	X

Issue 3: Alleviating pressures on precious ecosystems

DPSIR

Driving Forces	Pressure	State	Impact	Response
growth in tourism; economical and population growth	fragmentation; pollution; illegal poaching; land use change	biodiversity; ecosystem quality	LOSS OF BIODIVERSITY AND ECOSYSTEM SERVICES	Habitat protection (reserves); ecotourism; technology

Inter-linkages

	D	P	S	I
1	X			
2	X	X		X
3	X	X	X	X
4	X	X		X
5	X			

States and trends

S	Biodiversity: areas of native forest/wetlands/mangroves/coral reefs
I	id.
P	land use changes (forest to others) (km2) tourism (#) illegal poaching/overfishing (NB: increased monitoring influences conclusions) aquaculture (area)

Responses

Prerequisites

Good Governance
 Awareness, Education and Capacity

Opportunities

Climate proofing : reforestation contributes to mitigation
 Poverty Alleviation : protecting ecosystem services
 Gender : ?

Sub-regions involved

Aus/NZ	CA	NE	S	SE	SP
X	X	X	X	X	X

Issue 4: Land conservation opportunities

DPSIR

Driving Forces	Pressure	State	Impact	Response
economical and population growth; climate change;	salinisation; erosion; pollution; desertification; deforestation; land use change	quality of land	LAND DEGRADATION; Ecosystems services; agricultural production	reforestation; technology, ICZM

Inter-linkages

	D	P	S	I
1	X			
2	X	X		X
3	X	X	X	X
4	X	X	X	X
5	X			X

States and trends

S	(land use change: already presented in issue 3)
I	productivity (yield/area) (nb: conclusion difficult because of changes in fertilization and irrigation techniques)
P	desert area (km2) area affected by erosion/salinisation (km2)

Responses

Prerequisites

Good Governance ((land tenure/ownership)
Awareness, Education and Capacity

Opportunities

Climate proofing : agricultural practices/reforestation
Poverty Alleviation : food resources
Gender : agricultural practices

Sub-regions involved

Aus/NZ	CA	NE	S	SE	SP
X	X	X	X	X	X

Issue 5: Controlling consumption developments

DPSIR

Driving Forces	Pressure	State	Impact	Response
economical and population growth; industrialization	Increase in consumption; change in consumption patterns	Quantity (and type) of (solid & liquid) waste	Land degradation; human health; water quality	SOLID AND LIQUID WASTE MANAGEMENT Improvements in production processes

Interlinkages

	D	P	S	I
1	X			
2	X			X
3	X			X
4	X			X
5	X	X	X	X

States and trends

S	waste (kg/capita/yr)
I	area of landfills (km ²)
P	consumption (\$/capita/yr)

Responses

Prerequisites

Good Governance

Awareness and Capacity (technology/recycling)

Opportunities

Climate proofing : recycling/green production/industrial ecology

Poverty Alleviation : ?

Gender : ?

Sub-regions involved

Aus/NZ	CA	NE	S	SE	SP
X	X	X	X	X	X

*Europe***The “story-line” of the Euro-Regional Group on 22 June 2005***Overall outline includes following issues:*

1. “Good governance” and international cooperation;
2. Energy and climate change;
3. Sustainable production and consumption;
4. Transport and related impacts; and
5. Biodiversity loss and land change.

The European section of Chapter 6 will begin with a *background/introduction* on “**good governance**”, **regional & env’l. policy integration** and **international cooperation**, an overview of current policy measures in the EU and Eastern European countries that demonstrate these principles, and multi-lateral policy-making and implementation. It will touch on issues such as the 6th EAP Thematic strategies, MEAs, EMAS schemes, “three pillars” concept and its implications for strategy and planning, the Lisbon strategy, etc.

This initial sub-section will be used mainly for setting context of all that follows...

The initial background sub-section sets the scene for the *1st European sectoral issue*, that is **Energy** and links with **climate change**. The **status** of energy supply, flows and subsidies will be described, along with dependencies among the different European sub-regions (C. Europe on transit earnings and supply; E. Europe on payments received, and W. Europe on the supply), and the environmental **impacts** of energy transport and use (coal mining, oil fields, pipelines etc.). Emerging issues to be mentioned include renewable sources, revival of nuclear energy etc. Some of the **policy responses** to be considered are implementation of the Kyoto Protocol, carbon trading and emissions schemes, and investments in new energy technologies.

The current **state** of emissions and environmental **impacts** (air pollution etc.) will also be described, as potential drivers of *climate change* in the region and globally.

This discussion will provide an opportunity to transition to the *2nd sectoral issue*, being **sustainable production and consumption**. The initial example will be from the energy sector and explain current production and use patterns across the region, including the agricultural, industrial and household sectors. Households are the major consumers of “consumer goods”, from household products to electronic goods and home appliances (including computers), and *automobiles (add something on changing demographics)*.

The **status & trends** of consumption patterns in these different sectors will be described, and the use of new, more “environmentally-friendly” materials and technologies will be mentioned. Some of the **policy responses** to high/wasteful levels of consumption to be developed will include the Environmental Managing and Audit Scheme (EMAS) and “Lifecycle” (cradle-to-grave) Initiatives; i.e., responsibility of manufacturers to assure full product recovery at the end of a product’s lifetime. The growing problem of IT / electronic “e-waste” will be discussed, along with recycling measures undertaken in various sectors across the European continent; their successes and failures.

The coin’s other side of the production and consumption issue is the substantial and growing **European “footprint”** that has implications for neighboring and other world regions, in terms of growing resource demands and environmental impacts. This non-sustainable pattern will also be described and developed in some detail...

The growing use of automobiles and larger car fleet on European roads will provide the transition to the *3rd sectoral issue* in Europe, which is **Transport** and its **related impacts** on the environment. The current **state** ~ a steadily increasing number of automobiles in use (absolute, per capita) in transitional & other

countries and implications for materials consumption and related pollution (impacts) will be described. On the other hand, more environmentally-friendly, smaller cars using better materials, and improved (greater) use of public transport can be seen as alternative **measures** to reduce environmental impacts.

[Also describe the paradigm change from “mobility” to “access” - DS]

Some of the environmental **impacts** from (all forms of) transport to be explored include road congestion, noise problems and urban air pollution. Other transport sectors (goods movement by road/trucks, marine/inland waters and air travel) and their environmental impacts will also be described in this sub-section, including comparison of “efficient” and “inefficient” means, and links to human health problems and climate change.

Policy responses to these impacts/problems include the E.C. Trans-European Networks (TEN) initiative; the use of high-speed rail links, and plans to extend these from western to central/eastern European sub-regions/countries.

The development of transport corridors increasingly has the effect of causing land fragmentation, and this problem provides the transition to the **4th sectoral issue**, being **Biodiversity loss** and related land cover/use change patterns. Countries that have (and those that will) join(ed) the EU have agricultural quotas, and these often lead to land reform, overall shrinkage of farmland and reversion to more “natural” areas. Resulting land may become available to add to current nature reserves/biodiversity “core areas”; for example, as part of the Natura 2000 and EMERALD initiatives. Land transformation to other kinds of uses (agricultural to (peri-)urban; coastal areas being built up for holiday homes and tourism infrastructure; pasture land to developed and vice-versa) will also be described in this sub-section, along with related environmental/human impacts.

Thus, at the end of the section and in a final brief summary, the linkage is made back to the original, “scene-setting” subject that was “**good governance**”, through better management of land and biodiversity-rich areas across the European region...

[Need to include a brief discussion on research and application of new technologies to reduce resource use / improve resource use efficiency, tele-commuting etc.]

	Governance (general context)	Energy and climate	Sustainable Production & Consumption	Transport	Biodiversity
Driving forces	EU expansion; Collapse of COMECON and USSR in East, lack of joint coherent strategy among FSU countries. Civil Society involvement... 6th EAP	Energy demand growth. Energy price fluctuations.	Quality of life; Changing demographic structure, including ageing and migration; Increasing energy demand at higher prices.	Demand of individual freedom of movement; Freedom of access; Trade (pan-European and beyond)	Agricultural subsidies; Reform of CAP in the West; land reforms in the East; Demographics in rural areas; Long-range trade as source of invasive species
Pressures	Thematic Strategies, Env policy integration, MEAs, EMAS schemes, "three pillars" concept and its implications for	Emissions from fossil fuel energy production. Pipeline construction throughout the across region.	Wastes (both industrial and domestic), emissions into air, water, land under development, urban sprawl	Emissions from automotive sources, transport infrastructure development across Europe (transport corridors, etc)	Transport infrastructure developments, industrial agriculture, continuing sub-urbanization (mostly in the East)

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	Governance (general context)	Energy and climate	Sustainable Production & Consumption	Transport	Biodiversity
Impacts	strategy and planning. Lisbon strategy. PEBLDS Other policies in (South-) Eastern Europe	Acid rain, CO2 emissions, loss of land in coal mining, leaks of oil from pipelines and tankers.	Loss of biodiversity, poor air and water quality, (regionally and globally), human health problems,	Urban air pollution, noise, related health issues, traffic congestions, urban sprawl, habitat fragmentation at different levels	Loss of species, threat of inbreeding for certain populations, invasive species, loss of habitats, but also growth of biodiversity in certain areas
State		Air quality, damage to soil and forests	Air and water quality, soil degradation, groundwater pollution	Urban air quality, regional air quality, biodiversity loss, landscape damage	State of endangered species per country, state of landscapes, habitats, land-use changes
Responses		Kyoto, shift to natural gas, alternatives, renewables, nuclear alternative?	Agri-environment schemes, ISO and EMAS, product lifecycle analysis, factors 4 & 10, product labeling, consumers' initiatives, producing less emitting cars	Less polluting cars, trans-European transport networks, public transport services, bicycle developments in cities, air fuel tax, etc.	PEBLDS, Natura 2000, all sorts of pan-European networks, agri-environment policies, land reforms,

Latin America and the Caribbean

(6000 words)

Introduction

Land use planning as an overarching theme

- Land degradation (land use change, expansion of agriculture frontier, deforestation)
- Habitat loss and fragmentation
- Quality and availability of freshwater
- Coastal pollution and degradation
- Vulnerability to climate change
- Air pollution
- Payment for environmental services (pro and cons)

Priority Problems And Responses:

- Urbanization:
- Deforestation
- Coastal Degradation and Marine Pollution
- Regional Vulnerability to Global Climate Change

D	P	S	I	R
<ul style="list-style-type: none"> ▪ Free trade agreements → rural monoculture of crops (cash crops) ▪ Lack of job opportunities in rural areas because intensification of capital ▪ Land low price ▪ Consumption in the North 	<ul style="list-style-type: none"> ▪ Rural/urban influx ▪ Aquaculture ▪ Infrastructure development ▪ Livestock production for export ▪ Expansion of agriculture frontier + road development ▪ Coca plantations ▪ Timber needed in Asian furniture industries for Europe and USA 	<ul style="list-style-type: none"> ▪ High growth rate in urban areas ▪ High density areas with scarce services ▪ Deforestation 	<ul style="list-style-type: none"> ▪ Coastal degradation ▪ Coastal pollution (LBS) ▪ Land conversion to housing ▪ Freshwater pollution & overuse ▪ Increased air pollution + energy use ▪ Decrease quality of life ▪ Land degradation ▪ Habitat loss and fragmentation ▪ Local and global climate change + increased vulnerability 	<ul style="list-style-type: none"> ▪ Main streaming adaptation to global climate change (MACC) ▪ Caribbean Community Climate Change Center (CCCC) ▪ Holistic urban planning (Curitiba) ▪ Inaction before urban growth: weak governments from economic policies implemented since 80's which weakened the role of national planning and left to the market the use of the territory ▪ Rural/urban influx

Globalization has introduced an external driver accelerating internal processes

Analysis Of Responses:

- Inaction before urban growth: weak governments from economic policies implemented since 80's have weakened the role of national planning and have left to the market the use of the territory
- Environmental enforcements by governments are not driven by the market but by social pressures. Broader information access will allow this to continue.

Policy Instruments:

Policy	Level/category	Effective?	Why?
Holistic urban planning (Curitiba)		Yes	There have been leaders who wanted to do sustainable dev planning Good leaders: more education, more success stories, more access to information about success stories Rewards
Protected areas		Yes,	
Cartagena convention	Caribe/non-binding instruments	? oil spills, SPAW, LBP (not yet ratified)	Oil spill →action plan SPAW →too new, has implementation plan
CBD	Global/MEA	Many forest policy in region outdated With clear link to national policies	No sanction

Conclusions:

Land use planning really matters for increasing quality of life to all

Boxes: Emerging and cross-cutting issues (250 words each):

1. Trade Agreements and intellectual property rights CC
2. Monetization & payment for environmental services (including GHGs sink) E
3. Health & Climate and land use change-reappearance of epidemics (dengue, malaria, tuberculosis, chagas, west Nile virus) E
4. Energy supply and consumption patterns E

North America

6,000 words

12 pages

4 priority issues: 1,500 words, or 3 pages for each (keep room for one paragraph each for introduction and conclusion)

Analytical approach: on response side, focus on economic and market based tools and incentives; human health theme; ecosystem services (e.g. nitrogen cycle); role of R&D and innovation; global impact or footprint linked to material consumption; relate back to Brundtland report; take stock on relevant policy targets and scientific standards or benchmarks.

Flag: emerging trends, such as security of energy supply and potential environmental consequences; transboundary issues -- pressures, states, impacts, and responses; indigenous issues related to priorities; links with issues highlighted GEO-3 and 2002 regional GEO (*North America's Environment*), as well as the GEO year books.

OUTLINE of North American regional section

ENERGY SUPPLY AND EFFICIENCY, AND CLIMATE CHANGE

Introduction: overview of energy changes since Brundtland and responses to its recommendations. Relationship of energy consumption to GDP (weak decoupling). Rise in total and per capita energy use and associated GHG emissions. Reference to the UNFCCC and Kyoto and gap between targets set and actual emissions. Despite a strong regulatory tradition, since 1990s more emphasis on market based, voluntary or technology measures when compared with other regions of the world.

Storyline: entry point – continued high energy consumption in the region related to lifestyle choices and consumption. Energy security problems related to dependence on imports, inefficient regulatory environment, insufficient refinery capacity, and upward price pressures due to growing imbalance between supply and demand as global crude oil production peaks. U.S. is driving recent plans to develop new and alternative energy sources (nuclear, gas, clean coal, oil drilling in previously protected areas and also on private lands, etc.) Also attention to renewables and energy efficiency, but not as a priority. Despite absence of U.S. Federal Government in Kyoto accord, many U.S. states and municipalities have introduced targets for reducing GHGs. In Canada, entry into force of Kyoto stimulated support for R&D in environmental technologies and some efforts at all levels of government to introduce incentives to reduce emissions. Canada has a new national climate change plan, which is criticized as being too weak. Without the political will to implement energy efficiency policies, invest in and adopt renewable energy technologies and public transit, and take fast action on these and other fronts to address climate change, North America will suffer large economic and human health costs of too little action, too late while it continues to contribute disproportionately to impacts that will be felt far from its shores among the less fortunate.

[question/note: stick to energy and climate change or include energy and air pollution in this priority issue? Maybe the impacts of air pollution could be addressed in the Human Health and Environment section, instead. Also, given the overlap and links with the issue of sprawl, consideration will be given as to the most appropriate place in the section to expand on indicators that relate to both. For example, one or other of the sections will make the link to land use patterns and urban form – urban form in most North American cities is not conducive to mass transit as it was designed around the automobile and cheap oil. Many cities have or are building mass transit, but pre-existing settlement patterns are a constraint]

Content	Indicators (trend indicators – 1987-2007)
<p><i>State</i></p> <ul style="list-style-type: none"> • Supply crunch - dependence on imports, insufficient refinery capacity • Trend in energy consumption (transportation, industrial and domestic use) 	<ul style="list-style-type: none"> • trend in primary energy consumption • total final energy consumption by all transport modes and by all sectors • oil production vs consumption, and

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<ul style="list-style-type: none"> • Canada's reserves: Alberta oil sands, Newfoundland petroleum projects, gas off Atlantic coast 	<p>imports</p>
<p><i>Driving forces</i></p> <ul style="list-style-type: none"> • North American culture of consumerism • Weak decoupling of energy consumption from economic growth • Suburbanization and increased personal vehicle use, size and number of vehicles, size of homes [link to section on sprawl] • Artificially low price of fuel (up to 2004-05) and other hidden subsidies such as cheap parking, funds for highway development (externalities not internalized) 	<ul style="list-style-type: none"> • trend in GDP • trend in energy/GDP ratio • trend in fuel prices against trend in energy consumption
<p><i>Pressure</i></p> <ul style="list-style-type: none"> • Greenhouse gas emissions • 	<ul style="list-style-type: none"> • Emissions of GHG by sector and per capita • trend in vehicle miles travelled (vs population, employment and economic growth)
<p><i>Impacts (climate change)</i></p> <ul style="list-style-type: none"> • Ecosystem impacts of climate change: changes in hydrological regimes (extreme events), glaciers, impacts on biota and vegetation (permafrost melt, shortening season of sea ice), forest fire frequency • Human well-being impacts of climate change (heat strokes, emergence /resurgence of vector-borne disease ie., West Nile virus; impacts on northern communities and fauna) • Globally distributed impacts: rising sea level and small island states; increased severity of climate variability in sub-Saharan Africa? – make link to poverty alleviation agenda and potential for climate change to work against PA goals • Economic impacts: economic savings of CAFE (in 2000, it was estimated that CAFE improvements were saving about 2.5 million barrels of oil per day); costs of building protective barriers to rising ocean waters (such as the shores of the Barrier Islands where laws stipulate protection); Cost to ecosystem services – diffuse and difficult to measure, but real (e.g. effects on wetland functioning) 	<ul style="list-style-type: none"> • temperature, precipitation records (overall trends and extremes; show relative increase in temperature in higher latitude vs south) • frequency and intensity of storms – add box on increasingly intensive hurricane season • series of satellite images of glacier retreat • trend in incidence of West Nile virus cases
<ul style="list-style-type: none"> • <i>Response</i> • Responses on multiple scales (international; binational (Canada–US Air Quality Agreement and Ozone Annex); national (changes in both US (1997) and Canadian (2000) ozone and PM_{2.5} health standards); provincial/state (many US states have set targets); municipal (investments in public transport, for example) etc. • Responses to climate change should be the most dominant part of this section – federal, provincial / state and municipal action, commitments by business • Should cover mitigation but also adaptation measures, maybe as a box; feature e.g., early results from adaptation work on Canadian Prairies (IISD/PFRA joint initiative) 	<ul style="list-style-type: none"> • Renewables in the primary energy supply • Volume or value of carbon credits traded • Actual and projected emissions of GHG compared to Kyoto targets • Trends in fuel efficiency • Trends in urban transit ridership

<p>and other similar work in US</p> <ul style="list-style-type: none"> • Regulatory and market based measures (e.g. incentives for renewables) • Technological innovation (e.g., geological carbon capture, hybrid vehicles, renewable energy advances) • Fuel efficiency • Inadequacy of response: discrepancy between targets and actual emissions; 	
<ul style="list-style-type: none"> • <i>Conclusion:</i> short paragraph 	
<p>WATER SUPPLY AND QUALITY</p>	
<p>Introduction: overview of changes in water quality and quantity since Brundtland and responses to its recommendations.</p>	
<p>Storyline: entry point – Water has been viewed as an abundant resource in North America – especially in Canada – and North Americans have the world’s highest per capita water consumption. The spectre of potential regional water shortages, including more frequent and intense droughts in the region’s (and to some extent the world’s) bread basket as expected due to climate change, is an increasingly apparent threat. Over the past 20 years, however, there has already been ample evidence of regional water shortages, including the depletion of aquifers. At the same time, water pollution contributes to the decrease in availability of freshwater. Apart from the disappearance of a way of life, the loss of small family farms, where livestock were part of a system that returned manure to the soil to fertilize crops, has been accompanied by the expansion of large industrial livestock operations that concentrate animals and their waste. The result is an overabundance of nutrients in the environment. In some parts of North America, water bodies and coastal areas are suffering from nutrient overload and eutrophication due to the intensification of agriculture. Water quality / quantity problems affect not only human, but also <i>ecosystem</i> uses of water.</p>	
<p>[question/note: should this priority issue cover all aspects of water supply and quality, or rather should it focus on one or the other instead of trying to do too much? It could, for example, focus on land use change and water quality and underscore the problem of intensive livestock agriculture and nitrogen overload].</p>	
<p>Content</p>	<p>Indicators (trend indicators – 1987-2007)</p>
<p><i>Drivers</i></p> <ul style="list-style-type: none"> • Water as a free good (hidden subsidies for agriculture and lack of water pricing, for example) • Consumption of virtual water (meat-rich diets, for example); very high water demand for oil production from tar sands • Incentives for development of CAFOs (ie. cost and production advantages, tax breaks, subsidies, lack of anti-corporate farming laws related to their regional concentration, etc.) • Growth in coastal population 	<ul style="list-style-type: none"> • Trend in meat consumption • Trends in coastal population
<p><i>Pressures</i></p> <ul style="list-style-type: none"> • Irrigation • Municipal and industrial water use • Agro-chemicals and other industrial chemicals – emerging issue of PFOS in rainwater? • Livestock (duplicate, mentioned below) • Water control infrastructure • discharge of insufficiently treated wastewater or storm overflow • Large scale and intensified animal feedlots (CAFOs or Concentrated Animal Feeding Operations) 	<ul style="list-style-type: none"> • Trends in area of irrigated land • Trends in fertilizer and pesticide use (sales figures as proxy) • Trends in nitrogen content of commercial fertilizer • Trends (total and per capita) in industrial and municipal water use • trends in concentration and intensification of CAFOs (livestock numbers vs number of farms) • trend in number of livestock vs human population growth

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<ul style="list-style-type: none"> • Nitrogen from airborne sources (manure, power plants, vehicles) • Golf course irrigation and chemical use 	<ul style="list-style-type: none"> • Growth in number of golf courses, and distribution
<p><i>State</i></p> <ul style="list-style-type: none"> • Surface and groundwater and aquifer supplies • Municipal water supply and age of infrastructure • Ecosystem services such as wetlands and waterfowl 	<ul style="list-style-type: none"> • renewable water supplies • Trends in total consumptive water use vs population growth • Population living close to a polluted water source • Trends in classification of estuarine and coastal waters as ‘fishable or swimmable’ • Annual withdrawals of ground and surface water as a percent of annual renewable quantity of water available from the sources • CCME/NRTEE water quality index (for Canada)
<p><i>Impact</i></p> <ul style="list-style-type: none"> • Nitrogen and phosphorous and other nutrient loading (eutrophication in Lake Winnipeg and Manitoba; Mississippi-Missouri basin; Florida waters) • Devil’s Lake – emerging transboundary issue • Dead zone in Gulf of Mexico • Emerging issue: other dead zones (Chesapeake; central Oregon) • Red tides and other harmful algal blooms • Impacts on ecosystem functions – threats to habitat and species loss • Pesticides, nitrates, bacteria in groundwater • Walkerton tragedy – e-coli outbreak • Economic costs: costs of HABs (medical related expenses and impacts on the fishing and tourism industries); 	<ul style="list-style-type: none"> • Regional risk of groundwater depletion • time series satellite images of eutrophic water bodies • trend in size of dead zones • trends in number of coastal and estuarine waters that host major recurring incidents of HABs (and/or map of numbers and distribution) • Trends in beach closings • Farm wells with water exceeding nitrate level standards or objectives
<p><i>Response</i></p> <ul style="list-style-type: none"> • Integrated water resources management strategies (eg. Prairie provinces) • Regulatory and market based measures (e.g. incentives for water efficiency, including pricing, and land and wetland conservation, estuary management plans) • Innovative irrigation solutions • Bottled water use • Municipal monitoring, reporting, and infrastructure improvements • Wetland restoration • Nutrient management practices • Organic/sustainable agriculture • Investments in Gulf of Mexico dead zone • Controversy about mass freshwater transfer (from Canada to US) 	<ul style="list-style-type: none"> • Achievement of NEP targets • Trend in organic agriculture and other methods (IPM) and conservation strategies • Trends in bottled water use • Other indicators? • Investment in water infrastructure?
<p>Conclusion</p>	
<p>LAND USE CHANGE (Focus on sprawl)</p>	
<ul style="list-style-type: none"> • Introduction: overview of land use changes since Brundtland, focusing on growth in suburbanization, and 	

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<p>responses to its recommendations. Highlight trend in the development of coastal and arid areas and impacts on environment and ecosystem services</p> <ul style="list-style-type: none"> • Storyline: The 1990s saw an escalating cycle of sprawling suburbs, increased car use, longer commuting distances, decreased public transit options, larger homes, and new road building that reinforced suburbanization and car dependency. Affluence and the American dream of home ownership fed this cycle such that increasing numbers of people can fulfil their preference for house type and location. The ordinary North American makes no connection between the suburban lifestyle and environmental and health impacts – especially at the global level. 	
Content	Indicators (trend indicators – 1987-2007)
<p><i>Driving forces</i></p> <ul style="list-style-type: none"> • US and Canadian preferences/attitudes and values • Artificially low energy prices – up to 2005 (low taxes on gas and autos); price not reflective of social and ecosystem costs • Conducive zoning policies (single-use, large-lot zoning and subdivision ordinances) and other incentives (subsidies for extension of municipal services and roads; favourable tax laws for ownership and mortgages); lax land use controls; extensive highway investments • Weak municipal funding (devolving of responsibilities) and fragmented municipalities • Changes in family and dwelling sizes • Pull forces to coastal areas (retirement communities) and arid regions 	<ul style="list-style-type: none"> • funds to new road construction vs public transit • trend in house and house lot size/number of occupants • sources of sprawl: population growth vs land use-decisions
<p><i>Pressure</i></p> <ul style="list-style-type: none"> • Increased vehicle use and distance travelled • Decline in transit use • Land conversion 	<ul style="list-style-type: none"> • trends in VMT/vs growth in population • #cars/population; miles of highways • trend in transit use • trend in agricultural land converted to urban uses •
<p><i>State</i></p> <ul style="list-style-type: none"> • Suburbanization trends and distribution [population growth in/migration to dry areas and links to water supply section] • Recent growth in rural population – reverse trend to small urban centres 	<ul style="list-style-type: none"> • One graph showing area of land over time in various landuse categories (agricultural, forest, urban etc.) • trend in population distribution and density • trend in suburbanization • trend in growth of coastal population • trend in growth of towns • trend in growth of suburbs vs central cities
<p><i>Impact</i></p> <ul style="list-style-type: none"> • Loss of agricultural land and wildlife habitat • GHG and criteria pollutant emissions from increased private car commuting • Links to obesity due to sedentary life style? • [link to energy section and disproportionate contribution of North Americans to climate change and impacts on other parts of the world] 	<ul style="list-style-type: none"> • trends in exceedances of air pollution standards • trends in loss of agricultural land to urban uses – (refer to general landuse graph) • trend in obesity and linked health risks • [links to human health section]
<p><i>Response</i></p> <ul style="list-style-type: none"> • Regulatory and market based measures (e.g. incentives for compact urban planning (smart growth), public and alternative transport, fuel efficiency, hybrid cars) • NGO campaigns for smart growth 	<ul style="list-style-type: none"> • Trend in sales of ‘greener’ cars

Conclusion	
HUMAN HEALTH AND THE ENVIRONMENT	
<ul style="list-style-type: none"> • Introduction: overview of changes in human environmental health since Brundtland. • Storyline: The direct and indirect links between air and water pollution and various human illnesses are difficult to establish. One of the surest triggers for action to address environmental problems is when the public and decision makers become aware of how they affect human health, and the costs of these impacts to society and the economy. Increasingly, scientific research is uncovering these impacts and making them clear. • Highlight special vulnerability of groups such as first nations and children <p>[note/question: this section treats a cross-cutting issue, since the priority issues above all have impacts on human health. Perhaps this section could focus on the impacts of air pollutants?]</p>	
Content	Indicators
<p><i>Driving forces</i></p> <ul style="list-style-type: none"> • Weak direct links between environmental change and human health impacts • Many, interacting pathways – water, air, soil, food, other products, biota 	<ul style="list-style-type: none"> •
<p><i>Pressure</i></p> <ul style="list-style-type: none"> • Emissions of air pollutants (especially from power plants) and other sources: POPs, PM, heavy metals; high volume industrial chemicals • Emerging issues: Plastics as endocrine disrupters? Flame retardants? Rocket fuel (percholates) 	<ul style="list-style-type: none"> • Trends in emissions (Pollutant Release and Transfer Register (PRTR) data on industrial releases of chemicals and toxics) and criteria pollutants • location of major emissions • sectors of the economy that emit most pollutants • number of new chemicals approved for production per year
<p><i>State</i></p> <ul style="list-style-type: none"> • State of human health related to the environment: pollution presence in humans • Often difficult to directly attribute changes in health status to environmental causes 	<ul style="list-style-type: none"> • evidence of presence of various pollutants in human breast milk and blood • Percent of population living in areas where air pollution levels exceed relevant air quality standards • pesticide residues in/on foods • Body burden measurements for lead in children
<p><i>Impact</i></p> <ul style="list-style-type: none"> • Discuss health impacts linked to pollution; ie, developmental or neurological deficits in children attributed to exposure to toxic substances; cancer; birth defects; reproductive harm; disruption of endocrine system; etc. • Health risks greater among poor and aboriginals • Impacts on more vulnerable (children, elderly) • Grasshopper effect to the north (impact on Inuit) • Impacts on economy: costs to health care system of treatment, hospitalization -- increased costs of health care associated with respiratory and other health impacts; savings in health expenditures due to the Clean Air Act; 	<ul style="list-style-type: none"> • trends in asthma conditions among public and especially children • number of illnesses and deaths in population attributed to air and waterborne disease, pesticides in food, etc. • frequency of allergies in the general population • data on comparative trends in childhood asthma in polluted and less polluted cities? • data showing correlation between hospitalization and worker absenteeism, and episodic high O₃ levels?

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<p><i>Response</i></p> <ul style="list-style-type: none">• Stockholm treaty and other regulatory and market based measures (emissions standards, Pollutant Release and Transfer Registries; food quality standards)• Increase in institutions/research set up to study environmental health issues• Risk management (reduce exposure, manage triggers)	<ul style="list-style-type: none">• Volume of chemicals covered by the POPs Treaty produced or used in North America
<p>Conclusion</p>	

West Asia

Environmental Change in West Asia

Story Line

The West Asia section of the regional chapter (6) will be developed around five key priority issues for the region. Before addressing those issues, it will first provide an introduction with two sections. A section on the context of economic and social development in the region over the last two decades, differentiating diversified economies of Mashriq countries and Yemen, and oil based economies of the Gulf Cooperation Council and the increasing efforts for diversification. The section is on the key priority issues and the selection of those treated in GEO-4. The first issue to be addressed is water scarcity and quality affecting human well-being, ecosystem and economic development. Related and interlinked to water is the second issue on land degradation and desertification, and how water and land combined plays a key role in food security in the region. This is followed by the issue of the degradation of coastal and marine environment as a result of rapid economic development. The next issue is urbanization as one of the most rapid growing area of development having an impact on all the natural resources in the region. The final issue is peace, security and environment, which gained importance and accentuated within the last few years. The story will conclude with a section on the conclusions giving the main trends of environmental change in the key priority areas, their root causes, and the effectiveness of current policies.

Annotated Outline

Environmental Change in West Asia

Introduction:

a. The context of economic and social development

This section serves to provide the economic and social setting impacting on environment and ecosystems. It gives an overview of the economic and social development over the last twenty years, including the economic recession of the eighties, the economic recovery and economic reform of the nineties including structural adjustment and the effort for economic diversification. It also reflects on how the oil has played a key role in the economy of the region, and the intensification of economic diversity over the last five years. It highlights the degree of integration of the region in the global economy and the impact of globalization and world trade. It will also address the production and consumption pattern.

On the social side, it will provide an overview of the social development focusing on the fast population growth, the structure of population, poverty, human health, education, and labour forces in relation to the environment.

b. Environmental Priorities of West Asia

This section will provide a chapeau on what are the key environmental priorities in West Asia and the justification for focusing on the issues selected for inclusion in GEO-4.

Environmental Issues:

1. Water scarcity and quality

The section will highlight the physical constraints and the limited water availability in West Asia.

Driving Forces:

Population growth, urbanization, tourism, industrial development, and expansion of irrigated agriculture.

Pressure

Excessive water extraction, lack of proper technology, in appropriate water policies, pollutant discharges, salt water intrusions

State

Addressing conventional and non conventional water recourses.

Per capita water availability of renewable water resources, water consumption by sector (agriculture, domestic, and industrial-agriculture uses 87 % of water consumption), water shortage in urban areas, water contaminants, transboundary water resources.

Impacts:

Human well-being, ecosystems, economic growth

Responses

Integrated water resource management (demand management versus supply management), water policies and regulations, monitoring water pollution, availability of information, public awareness, use of efficient technologies.

2. Land degradation and desertification

This section covers degradation of land resources and desertification in a comprehensive way to include biodiversity and forest areas. It also addresses land degradation implications to food security.

Driving forces

Climate change and sea level rise, agriculture and urban development, agriculture subsidies, global trade, technology, armed conflicts, population growth, poverty, land ownership transport, hunting, forest fires

Pressures

Fertilizers and pesticides, salination, water logging, urban sprawling, deforestation, animal grazing, vehicle movement and infrastructure development, hunting,

State

Area affected by degradation or desertification, land use change, loss of biodiversity, deforestation.

Impact

Loss of land productivity and implication for food security, loss of habitat and biodiversity,

Response

Land policy reforms including ownership, institutions, monitoring of desertification, use of technology.

3. Degradation of coastal and marine environment

Under this section three regional sea areas in West Asia will be treated: Eastern Mediterranean Sea, ROPME Sea Area, and Red Sea and the Gulf of Eden. It will examine the changes in land and marine based activities leading to degradation of coastal and marine environment, especially oil activities, land fills and rapid urbanization, tourism, water desalination, fishing, and industrial development. It will look at the environmental changes and impacts on ecosystems and the coastal and marine water quality.

Driving forces:

Oil activities, urbanization and land fill, tourism, water desalination, fishing, and industrial development.

Pressures:

Oil spills, ballast water, pollutant discharges, infrastructure, alien species

Impact:

Degradation of coastal and marine ecosystems and marine biodiversity including fisheries, impact on human health, degradation of beach cleanness and coastal aesthetic value.

Responses:

Integrated coastal zone management and application of best practices, implementation of regional and international multilateral agreements, use of environment friendly technologies, environmental monitoring of coastal and marine environment.

4. Urbanization

To be addressed as a key human activity in the region, which has witnessed development rates faster than any other sector, and has had the most significant impact on environment and natural resources in the region.

Driving forces

Population growth, use of oil revenue, tourism, transport, rural to urban migration

Pressures

Solid and liquid waste generated, emissions, domestic water consumption, infrastructure development

State

Urbanization level and rates, level of air pollutants, amount of waste, noise level, energy use, green areas, slums

Impact

Impact on human health, loss of green areas, traffic congestions, degradation of city cleanness, degradation of land resources.

Response

Urban planning and zoning, integrated urban management (including waste management), air quality monitoring, laws and regulations for pollution control, public transport, use of environment friendly technologies.

5. Peace, security and environment

This section will review the instability, conflicts and occupation situation in West Asia over the last two decades, and how it affected economic and social progress and impacted the sustainable development process.

Driving forces:

Political, economic, religious, ethnic

Pressures:

Military operations, release of pollutants and oil, refugees

State

Ecosystem, water, soil, and air of affected areas.

Impacts

Direct impact: human health and well being, ecosystems damage and degradation,

Indirect impact: diverting resources to national and regional security at the expense of the environment

agenda.

Responses:

Assessment, restoration and monitoring of affected areas, regional and international cooperation, institutions.

Conclusions

Main trends of environmental change in the key priority areas, their root causes, and the effectiveness of current policies.

*Polar Regions***Polar Section of Chapter 6 Outline**

Joan Eamer (North), Christian Lambrechts (South)

Story Line

The Polar chapter is developed around five issues with a global to regional flow. The chapter has a strong, big-picture beginning, highlighting the global importance of the polar regions in terms of ecosystem processes and discussing the implications of this in terms of global change. Both the Arctic and Antarctic have cooperative international governance mechanisms, and these will be described and contrasted in this section, highlighting the jurisdiction and limitations. This leads to the primary issue for the polar regions – climate change – which will be presented both in the global context and with a focus on impacts and responses in the polar regions. The issue of contaminants provides a transition from global to regional – contaminants transported to the Arctic through atmospheric and ocean transport will be discussed primarily in terms of response, and local contamination will be briefly covered, also with a focus on response, as a legacy of past exploitation, and as a risk (radioactive waste in northern Russia). This is followed by the issue of increasing commercial exploitation in both polar regions, with global and regional driving forces (increasing demand for polar resources) and regional pressures (oil and gas exploration, fisheries, etc.). The final issue is a more specific, emerging issue for the Arctic that is related to the increasing commercial exploitation – habitat fragmentation, the breaking up of large intact habitat blocks into smaller pieces. This will be a one-page overview, showing areas under threat and the status of marine, coastal and land protection.

Annotated Chapter Outline

1. Polar ecosystems as global service providers (3 pages)
 - This issue serves as an introduction, setting the global importance of the polar regions in terms of cycles, fluxes, and critical habitat. The primary issue of climate change will be introduced in this section as the driving force behind changes in these global service providers.
 - Sidebar on International Polar Year to show how the importance of the poles is being acknowledged in the international community, and the recognition that understanding and monitoring the polar role in these global-scale processes is crucial.
 - The entry point is state, with the main discussion being on implications for policy and management at the global level. Suggested aspects of this issue to display:
 - a. Ocean circulation
 - b. Global energy balance or carbon balance
 - c. Migratory species – birds and/or whales – approach could be numbers of resident species versus numbers of species for which polar regions are breeding areas, showing the world-wide ranges on land and in the ocean
 - Description of international governance and cooperation, contrasting the two poles and highlighting jurisdiction and limitations. Include a sidebar on Arctic Council and one on the Antarctic Treaty Process to provide basic information.

(note – we still need to think this section through more – is this more in the nature of a descriptive introduction, or can we move more towards an analytical approach within the DPSIR framework?)
2. Climate change (3 pages)
 - Highlighted as the main issue for the region, with entry point being through ‘pressure’
 - Global issue, with polar regions being critical in global sense because of ice, feedback mechanisms etc., and with polar regions being impacted early and severely
 - Indigenous knowledge will be used in this section, and impacts on indigenous rights, culture and livelihood will be included, perhaps in sidebar(s)
 - Suggested indicators to include:
 - a. sea ice (map accompanied by statistics on changes in thickness and extent, with overlay on changes in shipping routes) past, current and predicted (?) – or will this be elsewhere in the report?

- b. Permafrost (feedback mechanism discussed, and implications on infrastructure)
 - c. Ice shelf (Antarctic)
 - d. Arctic tundra (shift in plant community composition)
- Discussion of response to climate change for the polar regions – highlighting vulnerability and resilience approach, and adaptation measures – this section will include Indigenous People’s perspective
3. Contaminants (2 pages)
- Approach to this is that the issue of contaminants is one mainly of impact of contaminants from global sources and pathways (persistent organic pollutants, mercury, CFCs resulting in ozone depletion). There is also a risk and legacy component from local sources, primarily radioactive waste in northern Russia.
 - The focus is on the ‘response’, for POPs and ozone (measuring progress), and showing the needs for international level response for mercury, other emerging contaminants (flame retardants) and for cooperation to lower the risks from radioactive wastes
 - Impacts (and risks) for human health, especially for indigenous peoples reliant on marine resources
 - Indicators – there are lots out there, and it would be best to focus on an emerging issue – suggest mercury.
4. Increased commercial exploitation of renewable and nonrenewable resources (3 pages)
- This issue will be introduced through the driving forces and pressures. The demand for polar resource exploitation comes to a large extent from outside of the regions and is related to depletion of resources in other regions and to policy directions (such as the US push to reduce reliance on petroleum imports).
Pressures:
 - ♦ For renewable resources, the focus is on Arctic and Antarctic fisheries, and on bioprospecting as an emerging issue (both poles?)
 - ♦ For non renewable resource, the focus is on oil and gas exploration and development, and mining in some areas (Arctic only)
 - ♦ Another commercial exploitation is tourism – for both poles – including cruises, air flights, infrastructure. There are environmental impacts for both poles, and an impact on governance for the Antarctic. Emerging issue for both poles.
 - Indicators: to be selected for each of the pressures listed above (one each for fisheries, oil and gas development, and tourism) – we will try to develop indicators that include a component of pressure (e.g. commercial fish catches) and of state/impacts (e.g. fish stock trends) where possible.
 - Discussion of the linkages between development and climate change as an emerging issue. This will be described through the use of one or more examples (an example is the opening of sea ice and changing shipping routes resulting in increased vulnerability of coastal regions to oil spills and impacts from increased tourism)
 - To consider: a sidebar on Arctic local governance and ownership of resources (especially in the context of indigenous rights), contrasting regimes among the Arctic Nations and making the link with environmental management.
5. Habitat fragmentation (one page)
- While this is a regional pressure and regional impact for the Arctic, it is of global importance (8 of top 10 wilderness areas are in polar regions)
 - Indicator and discussion on wilderness loss, including land, coast and marine protection, and degree of fragmentation (map-based)

Background information and notes

Chapter flow is based on the five Issues identified by regional group, modified with consideration of Antarctic, and checked against Arctic Council priorities and November 2004 interviews with Arctic GEO 4 stakeholders.

GEO-4/PAM-1/3 REVISED

1. Polar ecosystems as global service providers (fluxes and cycles, freshwater balance, sea level, migratory species....)
2. Climate change
3. Contaminants (ozone depletion, long range transport –Persistent Organic Pollutants, mercury, and radioactive waste)
4. Increased commercial exploitation of renewable and nonrenewable resources (fisheries, oil and gas, mining, tourism and bioprospecting)
5. Habitat fragmentation (8 of top 10 wilderness areas in polar regions)

Cross-cutting themes – to be included across the issues

1. Indigenous People's issues and inclusion of indigenous knowledge
2. Impacts on and measures to conserve biodiversity
3. Governance through international cooperative mechanisms – successes, gaps, emerging issues (to highlight both the importance of the polar regions to the globe and the importance of global decisions to polar ecosystem integrity and health and well-being of Arctic residents)

'Marching Orders' to keep in mind:

- Use DPSIR Framework for issue analysis, development of indicators
- Highlight policy, and performance in meeting targets
- 12 pages

Process of developing the Polar Region section of Chapter 6

1. Develop review group for the annotated outline to ensure balance of issues, adequate opportunities in the structure for indigenous knowledge and perspectives, and use this group to assist with the selection of indicators (which will mainly be from existing and developing regional assessments). This group includes representatives of Arctic Council working groups and University of the Arctic.
2. Contact experts in each of the identified issues and solicit assistance in indicator development and writing.
3. Peer review, engaging the first review group and experts in each issue area.

Issues to flag to other groups (to be added to)

- Marine noise pollution
- Glacial melt, freshwater balances
- Boreal forests (fear this will be left out as it is sub arctic and N.America and Europe will have a southern focus)

ANNEX 7: CHAPTER 7 - Interlinkages
Interlinkages: Environmental Change and Human Well-being**Executive summary (1 page, all chapter authors)**

Interlinkages are the interdependencies between and amongst environmental change, human well being and responses. Policy coherence requires addressing interlinkages at multiple scales and the creation of institutional mechanisms that bridge decision making. Some of the key limitations and barriers of policy coherence are bridging decision making across scales and time. Thus, interlinkages have not received adequate attention at the international, regional, national and local levels.

Effect of multiple drivers can lead to changes in groups of ecosystem services which in turn can affect a range of human well being constituents. Some of these consequences can be positive whilst others are negative. A careful analysis of the trade-offs and synergies is therefore required before policies are designed and implemented.

- There is recognition (scientific and from traditional knowledge) of interlinkages but few response options to address them. Many of the response options are still developed in the context of one environmental change (e.g. climate change) and not across interdependent environmental issues.
- This Chapter will address the question of whether policy coherence based on the analysis of interlinkages can provide multiple benefits to society and environment with minimum additional cost and deal with reality on the ground.
- Benefits to environment and for development can be realised by adopting an appropriate mix of policy responses and practices (technology, societal and behavioral, economic...) that explicitly recognize the linkages that exist within and amongst environmental change.
- What are the most efficient responses? Legal mechanisms (issue of enforcement/compliance)? Change in values and mindset (challenge to get people to think differently and in an integrated way)? Market-lead responses? Education (no one-fits-all solution - need for education at all levels - community, policy-makers)? Institutional integration?
- Role of NGOs: failure to properly address the issue? Civil society organizations are mobilizers of societal opinion thus, to educate the public, we need them to take interlinkages into account. Difficulty to get environment and development groups to work together.
- The breakdown between environment and development results from inadequate institutional mechanisms to bridge the three pillars of sustainable development (e.g. ineffectiveness of ECOSOC, no adequate mechanisms to bridge WTO).
- Funding has been a barrier to creating interlinked policies because it is usually targets single aims (i.e. one issue). Need to create disincentives to make sure that things do not stay the same. Need for incentives (e.g. financial) to get various government agencies/institutions to work together. But funding should not be used as a mechanism that will result in unfair measures.
- There is a need for institutional mechanisms to work between national governmental departments that have adequate power and financing and can provide the right incentives so that integrated policies can be realized. Ex: look at Tanzania, SIDS and Germany bureaucratic models vs. Mali bureaucratic model.
- There is a gap between priorities across scales and sectors (e.g. climate change vs. air pollution). This creates a barrier for integrated policies.

- The impacts of interlinkages between environmental changes on human well being needs to be recognized on the ground. This link to human well being must be made if decision makers are to adopt integrated responses.
- A lack of responses addressing the strong interlinkages of environmental change has led to missed opportunities to improve the implementation and compliance of MEAs.
- If interlinkages are to be considered and policy coherence improved, then UNEP, as a coordinator and a catalyst of environmental issues, has a strong role to play in promoting, facilitating and implementing integrated responses addressing interlinkages, including coordinating MEAs.
- One of the benefits of interlinkages is the possibility to improve implementation of and compliance with MEAs as binding legal instruments that can be used to improve human well being through responses such as the MDGs.

1. Introduction (3 pages, HG, BC)

1.1 Context

At the moment we tend to work on a single cause and effect at the global, regional, national and local level, for example: The effect of climate variability on human health, Climate variability and food production, Food production and access and human health, Effect of land degradation on biodiversity, economic growth and material wealth.

The policy process is evolutionary [change over time]

Take advantage of this to present the need for integration to move away from fragmented and compartmentalized approaches because of the need to see the multiple links between environment, environmental change, and human well-being

The dynamics, including the resilience, of systems (both social and biophysical) are at a stage that allows us to still take action to avoid irreversible changes in those systems in the immediate future

1.2 Definition

Multiple definitions often on a linear basis

Need to move toward a spatially and temporally multidimensional approach

Working definitions:

- Interlinkages are the interactions and feedbacks that lead to synergies and/or tradeoffs that exist within and amongst environmental change, human activities, ecosystems services, constituents of human well-being, and policy responses.

- An integrated approach is part of integrated response options.

Their analysis would facilitate the coordination between policy responses at the same and different scales of decision making.

1.3 Benefits of considering interlinkages

Addresses reality on the ground in a manner takes advantage of synergies and helps environmental and human well-being

Cost-effective to deal with multidimensional impacts

Marginal cost of adopting an interlinkages approach is minimal when compared to the opportunity cost and benefits, especially at the national level

Improved implementation and compliance with MEAs through strengthening and learning between institutions which can help achieving the MDGs (e.g. MDGs 7 and 1) and sustainable development.

Increased policy coherence, including:

- a more integrated approach to the challenges of mitigation and adaptation to biophysical drivers or environmental change
- Potential for enhanced cooperation and collaboration for projects, investment and financing, as well as enhanced international environmental governance (ex: coherence between policies and activities of UN agencies – coordination between scientific and technical activities, harmonization of national reporting, joint capacity building activities...).

1.4 Challenges

Time and space: differences between decision-making and effects

Challenges to thinking about environment and development

- Moving from sector-based approaches to integrated approaches
- Need for action now in the face of socio-political inertia
- Coordination and collaboration for policy coherence across the sectors and between actors
- Need for linking science and policy at all levels (international, regional, national): policy-makers need to base the responses on scientific findings/knowledge (including scientific assessments), related to interlinkages between the biophysical drivers.
- Information for building and operationalizing understandings of the linkages from both biophysical and social perspectives
- Challenges for encouraging investment (financial, human capacity, policy development)

1.5 Scope and objective of the chapter

Chapter will build on a number of assessments, some that deal with interlinkages (see literature section and also UNEP concept paper – 29-02-04 as part of the project on mapping assessment landscape)

Will address the following main question and subquestions

What are the main interlinkages between environmental change, human activities and their consequences on human well-being, and responses for mitigating and adapting to these changes?

- What are the key interlinkages between environmental drivers?
- How do these linkages are manifested at different scales, specifically at the global, regional and national levels?
- How do these interlinkages and their cumulative impacts affect human well being?
- What are the priority interlinkages between environmental drivers and thereafter the impacts on human well-being?
- Are decision-making mechanisms at the international level (e.g. G-8...) effective to address the interlinkages issue?

Will draw on case studies from different countries and regions that have attempted to use an interlinkages approach

Governance systems have been fragmented and diffused and this has led to decisions making that does not account for the interlinkages between drivers of ecosystem change, the implications of change on human well-being and the trade-offs between ecosystem services.
 Starting from multiple environmental changes (biophysical drivers) and main groups of changes, this chapter will look at their impacts on ecosystems services and their consequences on human well-being. The chapter will also analyze and assess the integrated responses that have been used to address selected main interlinkages, and will look at the effectiveness of each based on scale and in consideration of time.
 Will identify research and assessment gaps related to interlinkages
 Will draw on the material from chapters 2-6
 Provide information to chapters 9 and 10

2. Multidimensional Interlinkages (25 pages)

For each example: biophysical and Ecosystem services lead (+team) HG, SO,

Human well-being lead (+team) AD, JF, EC, EG, NS

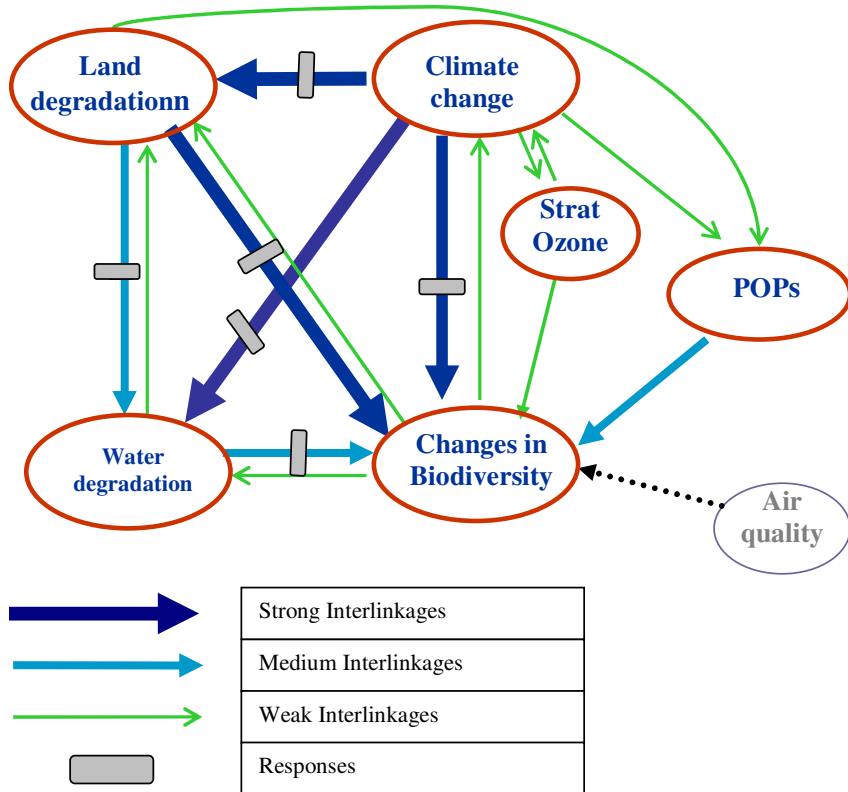
Responses (lead +team) BC, CS, AO, GH, BG

We will deal with some interlinkages and feedbacks that are strong. These are supported by scientific information and need responses for maintaining the environment and human well-being

Not just dealing with linear, but web or a network of linkages

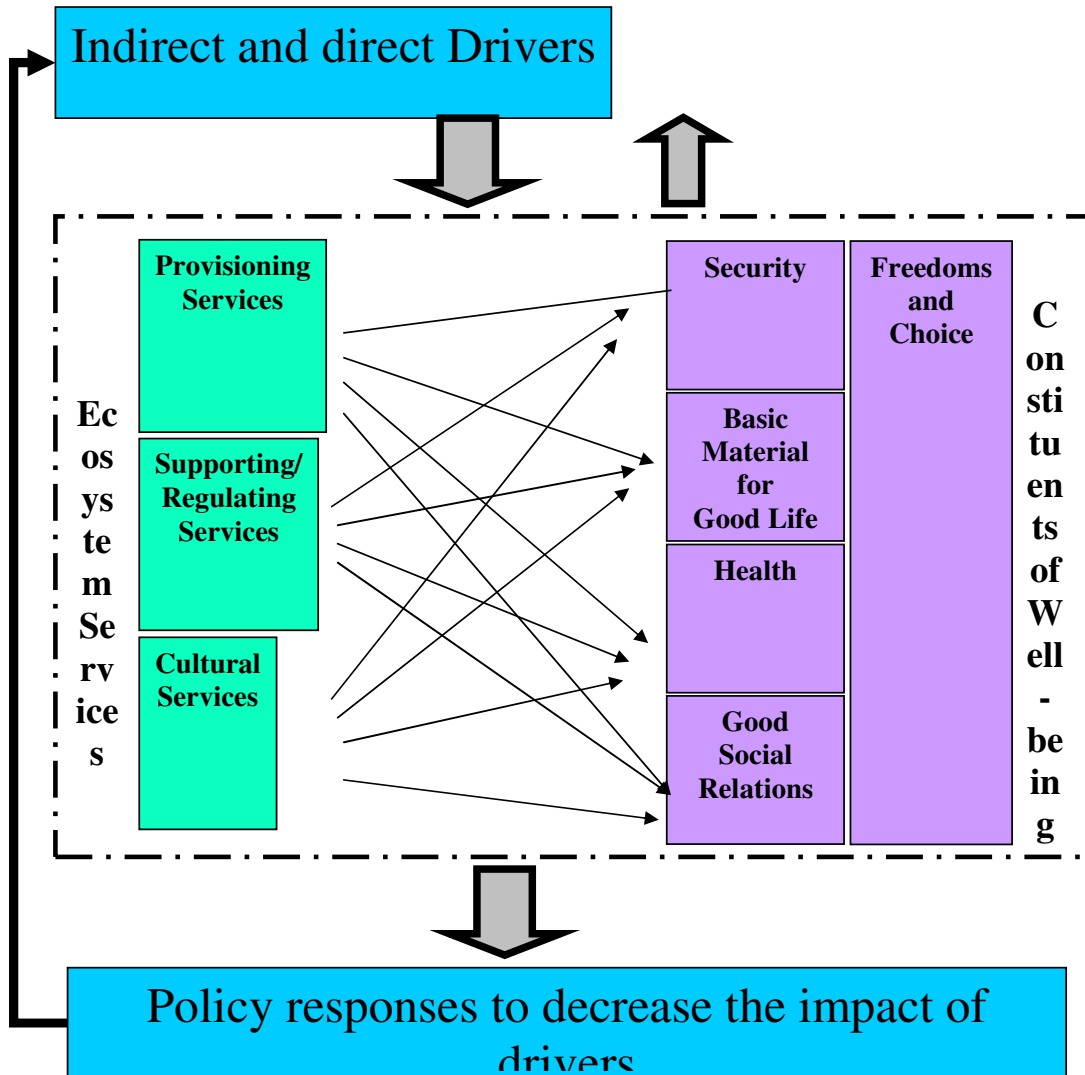
2.1 Framework for analyzing interlinkages

There are strong, medium and weak interlinkages (figure 1) and we will consider these from the starting point of biophysical drivers.



There are responses that can address strong interlinkages (see Box 1) and also cross-cutting integrated responses.

There are interlinkages amongst and between the drivers, the ecosystem services, the human well-being constituents and policies (figure 2).



Should we add something on criteria for assessing the policies?

2.2 Strong multidimensional interlinkages

Describing a web of interlinkages between environmental change that from the scientific assessments appear to be strong. These are at global level, but can also be relevant at other scales, especially regional and/or national.

We will describe a number of examples that illustrate the strong interlinkages amongst climate change, biodiversity and land and water degradation, and the impacts of these on human well-being, including their cumulative (i.e. additive and multiplicative) impacts on each other and human well being. Feedbacks will also be considered.

Box 1: Various types of integrated responses

- Integrated economic responses

Integrated economic responses are combination of financial and monetary measures and instruments that are designed to achieve a common goal or set of objectives.

- Integrated legal and institutional responses

Integrated legal responses are regulations, laws, customary rules, precedents, codes and principles etc used to create integrated policy objectives (Drivers, HWB, ES). They can be both soft law and hard binding law. Integrated institutional responses are often closely related to legal responses. Integrated institutional moderate human behavior and thereby, over multiples objectives (Drivers, HWB, ES) they are the rules of the games but can be formal and informal. Institutions are often the mechanisms by which the interlinkages are created as they require lesser transaction cost to create and can be adaptive to the circumstances such as bridging MEAs or issues such trade and environment.

- Integrated social and behavioural policies

Social and behavioral responses include among others population policy, public education and awareness, empowerment of communities, empowerment of women, empowerment of youth and civil society disobedience. They can be powerful instruments used to shape ecosystems and human well-being in a positive manner.

- Integrated science and technologies and transfer

Integrated technology responses are those that relate to solving ecosystem-related problems by using

technology sustainable alternatives to polluting industrial processes or harmful commercial practices. An

integrated technology response would be those technologies that might address multiple drivers, or multiple dimensions of human well being (HWB), or two achieving objectives found in more than one policy.

Integrated scientific responses could be those that focus scientific research and assessment to looking at the interlinkages between, drivers, HWB, and/or Ecosystem services.

2.2.1 Climate change-Land Degradation-Biodiversity

2.2.1.1 Example 1: Terrestrial systems

Climate change (temperature, precipitation, extreme climatic events, and disturbances, e.g. fire intensity and frequency are indirectly affected by climate change and mediated through vegetation cover/composition) affects the rate and magnitude of land degradation (productivity, erosion etc), land degradation in turn leads to changes in biodiversity (composition/dominance, invasive species, structure, functioning).

Climate change also affects biodiversity in various ways – to be expanded

Then will consider the consequences of all these on Ecosystem service, and consequences of the environmental change and changes in ecosystem services on various constituents of human well-being. Addressing the last two points is where the value added will be from other assessments.

ADD BOX FOR CASE STUDY

2.2.1.2 Example 2: coastal systems

Fisheries, coral reefs and mangroves are affected.

To be expanded along the line above

ADD BOX FOR CASE STUDY

2.2.1.3 Integrated response section

International/national

Joint MOUs between CBD, CCD and Ramsar GEF's Capacity development initiative
Adaptation
CDM and JI addressing carbon sequestration and mitigation but has implications for other environmental changes and ecosystem services.

2.2.2 Climate change-Biodiversity

2.2.2.1 Example 3: Coastal, marine

Coastal and near-shore examples to be developed along the above line.
Here we will bring in sea level rise, fresh water lens and human well-being
ADD BOX FOR CASE STUDY

2.2.2.2 Example 4: Terrestrial systems

Will bring links such as changes in composition and distribution of species, genetic changes through changes in population size and distribution, as well as changes in ecosystem services, including loss in food and fibre.

ADD BOX FOR CASE STUDY

2.2.2.3 Integrated response section

2.2.3 Water degradation-Biodiversity (changes in biodiversity)

2.2.3.1 Examples 5: freshwater (terrestrial landscape)

Pollution – point and non-point source coming from human activity to be considered
Various ecosystem services will be considered as parts of the linkages and would include Water quality, food and in turn the consequences of these on human well-being constituents will be assessed.

ADD BOX FOR CASE STUDY

2.2.3.2 Integrated response section

2.2.4 Climate change-air quality- chemicals (ozone, particulate, chemicals)

2.2.4.1 Examples 6: effect of climate change, chemicals and air quality

Increase of tropospheric ground-level ozone affects air quality and leads to increased rates of respiratory diseases and morbidity.
Increased frequency of heat waves resulting from climate change.
Changes in climate variability impacts on human health directly through changes in morbidity and mortality, and indirectly through the impacts on water quality and food availability.
Chemicals such as agro-chemicals, fertilizers, emissions from transport sector and industry have impacts on human health through pollution and degradation of soil, water and air quality.
ADD BOX FOR CASE STUDY

2.2.4.2 Integrated response section

Will include mitigation and adaptation

3. Cross-cutting integrated responses (5 pages)

Leads and team: BC, JF, AD, EC, BG, AO

There are various responses that are cross-cutting and include Johannesburg Plan of Implementation, the Monterrey Consensus etc. These will be assessed here.

See what is being asked of chapter 7 (institutional structures)

Emerging policy trends that are gaining acceptance and how effective are they?

4. Adoption and further development of tools and responses to implement integrated approach (8 pages)

lead and team: HG/EC, AD, SO, EG, BG, NS

This section aims at providing the policy-makers with the necessary information to enable them to create integrated or interlinked responses. The section will look at these tools on the basis of case studies from the developing, developed and economies in transition perspectives.

4.1 Monitoring and evaluation techniques

economic indicators

social indicators

biophysical indicators

modelling approaches

forecasting

4.2 Geographical Information Science

Remote sensing – gaps that can be identified which if addressed can help in the implementation of an integrated approach

Community mapping

4.3 Total economic valuation techniques

4.4 Planning

Strategic environmental impact assessment (policy and planning)

4.5 Integrated assessments

global

sub-global (regional, national, local – MA, GEO -regional)

4.6 Adaptive management

4.7 Capacity building

5. Barriers and Opportunities (2 pages)

- Links between MEAs and MDGS
- Need for policies addressing strong interlinkages:
 - enabling environment for policy making
 - learning
 - institutional structures
- Need to integrate implementation of obligations under international environmental law and national plans and policies.
- Trade blocks and their effect on environment and human being from the present to be looked at sometime in the future.
- Need for tools to build upon interlinkages

ANNEX 8: CHAPTER 8 - Challenges and Opportunities

Executive summary (2 pages)

1. Introduction (3-4 pages)

- Objective: this chapter assesses the human-environment interface and discusses challenges to and opportunities for improving human well-being.
- In the overall context of GEO-4, this chapter seeks to find opportunities for improving human well-being by mainstreaming the environment into six important policy domains (cross-cutting issues): poverty; human health; institutions and governance; trade; science and technology, and conflict and cooperation.
- A vulnerability framework is used to look at the relevance of these six cross-cutting issues to human well-being. Vulnerability is very context and place specific. Therefore we include place-based integrated assessments of the interactions between environmental change, the impact of the changes on human well-being and the loss of ecosystem services.
- Chapter 2-6 discuss the state of the environment using the DPSIR framework. This chapter focuses on the Impact and Responses boxes in the GEO-IV overall conceptual framework, by looking at impacts of environmental trends on human well-being and the vulnerability of human-environment systems.

The introduction section includes:

- General introduction on the aims of the chapter
- Recap of Brundtland on vulnerability and mainstreaming (integration)
- The vulnerability perspective will be introduced in this section
- Roadmap for the rest of the chapter

2. Vulnerability and Human Well-being (5-6 pages)

This section will develop a conceptual framework for considering cross-cutting issues, impacts, vulnerability and human well-being, building on the DPSIR and MA frameworks.

Four components of human well-being will be considered. These are material needs (such as access to resources, income), human health (such as nutrition, environment related diseases), security (such as personal security and disaster preparedness), and freedom of choice. These aspects of human well-being are critical to increase and enhance the capacity to adapt and manage environmental change.

This section has the following content:

- Cross-cutting issues and the relevance for human vulnerability will be discussed conceptually
- Definition of human well-being, importance of environment for human well-being, identification of components of human well-being and indicators
- Relating cross-cutting issues, impacts of environmental change, vulnerability and human well-being

3. Global context of vulnerability (5 pages)

This section is contextualizing the analysis of patterns of vulnerability and will have two major components:

- Global political and economic trends
 - ♦ Trade and globalization
 - ♦ Global governance (MEAs, PPPs etc)

- ♦ Political context, for example proliferation of liberal democracies
- Global environmental change (from chapters 2-6)
 - ♦ Climate change
 - ♦ Biodiversity

Here relevant policy developments from Brundtland Report till now will be discussed in terms of their interactions with the issues covered in this chapter. The global political and economic trends as well global environmental change provide the global context in which human vulnerability is playing out. Relevant trends in relation to the cross-cutting issues will be part of the analysis.

This section will recall significant information on environmental state, variability, hazards and trends discussed in chapters 2-6 in relation to vulnerability.

4. Archetypes of vulnerability

(20 pages)

Archetypes of vulnerability are defined as a specific, representative pattern of the interactions between environmental change and human well-being. These will be used as a framework to assess the context-specificity of environmental change, multiple stresses and human vulnerability. Trends over the last 20 years will be presented. This may allow policymakers to recognize their particular situations within a broader context – providing regional perspectives and important connections between regions within a global context (i.e. a ‘dryland archetype’ taking place in West-China, Sahel and NE-Brazil). The set of archetypes to be included has to be relevant for developing countries, countries in transition and industrialized countries.

These archetypes will reflect the findings of chapters 2 to 6.

The archetypes that are presently proposed for the chapter are given below. Actual inclusion in the report will depend on further discussions on regional priorities.

- Drylands in Developing countries
- Agriculture and Globalisation
- Water stress in Industrialised countries
- Heavily urbanised coastal areas
- Export of Vulnerability and Consumption patterns
- Infrastructure depreciation
- Institutions and resource rich areas
- (Post) Conflict induced vulnerability
- Rapid economic growth
- Inertia and Lock in looking at energy systems
- Common Pool/Property resources
- Unequal exposure to environmental hazards (human settlements)

The template for Archetype analysis and descriptions will look as follows:

- What are the main pressures – environmental and socio-economic?
- Key vulnerable communities, social, economic groups involved, including gender dimensions
- What are the major (sub-)dimensions of human well-being?
- How do the six cross-cutting issues shape the particular vulnerability?
 - ♦ Poverty
 - ♦ Trade & Globalization
 - ♦ Science & Technology
 - ♦ Human Health
 - ♦ Institutions and Governance
 - ♦ Conflict and co-operation

- Challenges: How does the human-environment system relates to
 - ♦ human well-being
 - ♦ environmental consequences
- Opportunities: Policy responses
- Boxes with real world stories
 - ♦ general
 - ♦ “success stories”
 - ♦ indicators, measures, maps, graphs

As part of the policy analysis of the archetypes, the following questions will be looked at (also taking into account the issues to be addressed in ch. 10)

- What aspects of the global, political and economic environment influence vulnerability and opportunities for human well-being?
- What opportunities do the six cross-cutting issues provide for enhancing human well-being and the environment?
- What initiatives have been taken by actors at different levels to reduce vulnerability and improve human well-being?
- What impacts have they had?
- What has been the record with their implementation?
- What were the obstacles to their implementation?
- How could they have been more effective?
- How does the institutional frameworks and governance at higher levels influence adaptation and mitigation at the lower levels?
- How do people respond to environmental change?

The impacts on human well-being of the previous chapters and this chapter will be synthesized for further consideration in section 5.

5. Environment for development: opportunities to enhance human well-being (20 pages)

This section first uses the six cross-cutting issues as entry-points for analysis of response. An attempt will be made to analyse how initiatives across the six cross-cutting issues have impacted/shaped vulnerability and human well-being in the archetypes and to scale up these lessons. In doing so we look at interactions across levels- the influence of the international governance and political context on decision-making at national and lower levels. The influence of the policy/response context at higher levels on local efforts at mitigation and adaptation to environmental change will be examined. This could give leads to building an enabling policy framework to facilitate adaptation, reduce vulnerability and enhance well-being.

The next part of this section will return to the cross-cutting issues in a broader context, recapping the policy responses discussions from chapters 2-7, and address the question on what are the opportunities to improve human well-being and the environment through those **domains of policy-making** at multiple levels:

- poverty
- human health
- science and technology
- trade
- conflict and cooperation
- institutions and governance

6. Conclusions and future outlook

(4 pages) –

Depending on guidance given by UNEP on overall policy to include conclusions

References

Linkages to other chapters

- section 2 relates to ch. 1 and 7
- section 3 relates to ch. 1, 2-6
- section 4 relates to regional priorities
- section 5 contributes to chapter 9 and 10
- coordination ch. 7-8

Messages for UNEP:

The chapter authors feel a strong need to have the opportunity to have two additional meetings with the complete group of CLAs and LAs to produce a chapter that fulfill the high quality standards set to us within a very tight time schedule set up UNEP/DEWA.

- The first meeting should take place during the preparation of the zero-order draft.
- The second meeting should take place soon after we have received the full set of reviews on the first order draft.

We understand the conditions under which we have to operate, but do hope that the necessary resources can be provided to arrive at good results.

We will put forward to UNEP a conceptual framework on the link between environment and human well-being to be developed in section 2 as soon as it becomes available (September) for consideration in the overall framework of GEO-IV.

ANNEX 9: CHAPTER 9 – The Future Today

Chapter 9: Outlook
Annotated Outline Draft: 28 June, 2005

Executive Summary**1. Introduction****Context**

- Place chapter in context of whole report and relationship to previous chapters
- note that this chapter is now turning toward the future in terms of environment for development in a number of plausible futures
- Goals of the chapter and the scenarios: to address the questions: “where might we be headed?” and “what are the implications of alternative policy decisions?”
- build on GEO3 scenarios in the following ways: i) improve global-regional and regional-regional links; ii) extend from 2032 to 2050; iii) improve and extend quantification; iv) extend use of scenarios in policy analysis; v) improve communicability; vii) explore specific feedback loops between drivers and between outcomes and drivers.
- time frame – importance of looking out to 2050 and beyond for longer-term developments; importance of noting status in 2015 because of MDG targets
- clarify choice of regional priority issues, interlinkage issues, cross-cutting issues, headline indicators, and policies examined, i.e. how they are drawn from the work presented in the other chapters
- Summarize methods employed in producing chapter
 - ♦ What scenarios are (and are not) and why they are important
 - ♦ Combination of narrative and quantitative: what techniques and models used
 - ♦ Definition of key terms (probably in boxes?)
 - ♦ Handling uncertainty (presented briefly in box with reference to a more substantial document/technical note we will produce on how uncertainty has been handled – *could be an idea for this to be for whole report and not just our chapter*)
- Explain how and why the 4 specific stories were determined/chosen
 - ♦ 1-2 sentence synopsis of 4 scenarios (see p.321 in GEO-3 for example)
 - ♦ explain how this work complements other efforts (e.g. MA, IPCC, IAASTD, OECD Env. Outlook, AEO2) include where we have had collaboration; carefully and clearly describe similarities and differences so as not to confuse readers

2. Run-up to Scenarios

- general discussion on key drivers (referring back to conceptual framework): this is more to introduce the concept than to necessarily provide detailed information
- introduction to current state and recent trends, including recent events and developments, particularly as related to key drivers: this will be primarily narrative, but may also include some basic quantitative information; this will largely derive from material provided in earlier chapters
- it is important that the above also highlights ‘shadows’ of the future in the present/seeds of change/weak signals

3. Scenario 1:

- Global story with regional richness (Primarily narrative, some quantification, possibly imagery; must include discussion of how drivers evolve and implications)

- Regional highlights, including priority issues from chapter 6 (and others?) and specific regional quantification
- Examine fundamental questions at global and regional levels: What is happening to the environment (throughout the scenario) and why? What are the consequences for humanity? Where are we headed at the end?

Scenarios 2-4: As above

4. Looking Across the Scenarios

- Quantitative Data – drivers, high-level indicators + some others (where appropriate spatial breakdown should be by sub-region or lower in case of detailed maps)
- Short pieces on Interlinkages (from chapter 7)
- Short pieces on Cross-Cutting Issues (from chapter 8)
- Implications of Shocks/Surprises/Discontinuities within scenarios

5. Key Messages (remember to compare with guiding questions)

- Role of policy, technology, environment, human behaviour in influencing possible futures
- Role of policy, technology, environment, human behaviour in coping with possible futures
- Key tradeoffs that may need to be considered in reaching desired visions (leading to chapter 10)
- Economic and social costs of inaction
- What are the robust findings and uncertainties that must be addressed?
- Appropriate ways of dealing with issues of inertia and uncertainty in policy sphere; precautionary approach

 ANNEX 10: CHAPTER 10 – Policy Options

CHAPTER 10 OPTIONS FOR ACTION

(Total Length - 30 pages)

Purpose of the chapter: Synthesise the overall policy-relevant findings and conclusions of the GEO-4 assessment, and assess the state of knowledge and global best practice regarding the effectiveness of different approaches to formulating, mainstreaming and implementing environmental policies. Reveal the relationship between the policy and institutional mixes that have been adopted. Address the impacts of inadequate policies and the financial, institutional and practical mechanisms (including ensuring compliance with MEAs). Provide a clear set of policy choices that will help influence decision-makers concerned with socio-economic development, consistent with cultural and gender circumstances. Questions to be answered include:

- What are the main conclusions and overarching policy findings of the fourth Global Environment Outlook, and is there a need to adjust our approach to implementation of the existing goals and targets (or to adjust our expectations, or both)?
- How can environmental institutions most effectively ensure compliance with and enforcement of multilateral environmental agreements?
- What are the financial, institutional and practical requirements for promoting new and innovative policies, strategies and response measures, including social learning to support environmental management?
- What instruments (tools) exist to mainstream environmental concerns into social and sectoral plans and policies, including contributing to sustainable development and poverty-reduction strategies?
- How do we address the need for science, data, indicators, monitoring and assessment to measure progress towards the environment dimension of the Millennium Development Goals (MDGs)?

Executive Summary (1-2 pages)

- Premises
- Synthesis of Policy Landscape
- Emerging Policy Trends
- Policy Options for Critical Issues
- Implementation Options
- Final Words

The global environment is under severe threat and several issues may be approaching tipping points, beyond which the consequences would be disastrous. These include [climate change, land degradation, water scarcity, urban air quality etc.] There is now significantly improved scientific evidence pointing to these changes. There is an urgent need to reinvigorate the environmental dimension of development and to ensure that environmental concerns are integrated into the mainstream of public policy at the global, regional and national levels.

Very few of these critically important environmental issues have clear targets, defined strategies, and viable implementation plans. Of the [23] most pressing issues global identified in chapters 2-5, only [6] have clear targets, and of these only [1] has a clear action plan that delineates roles and responsibilities and estimates costs. Without knowing the ultimate conditions or end state desired for these issues, progress towards resolving them cannot be reliably assessed.

Of the environmental issues lacking detailed policy targets, strategies or implementation plans, those that have the potentially most severe consequences include [indoor air pollution], [water scarcity], and [land degradation]. Indoor air pollution, for example, kills approximately the same number of people

as malaria, yet does not have the same kind of policy apparatus or global attention associated with it. Such environmental problems are increasing in severity, require significant investments to manage effectively, and will take time to make progress. If policy-makers wish to address these issues they may wish to start considering actions sooner rather than later.

Environment is not a sector, but is integral to all human activities. Cross-cutting issues and sectoral linkages, therefore, require as much attention as thematic (air, land water, and biodiversity) and regional issues. Rarely has the environmental dimension of [trade, science and technology, poverty] been accorded adequate treatment. For example, introduction of new technologies (such as biotechnology) while offering considerable potential has almost never been subject to any form of environmental assessment, let alone cumulative impact assessment.

There are some policy steps that have been demonstrated to work effectively and would bring quick positive returns. These include [eliminating use of leaded petrol], [replenishment of soil fertility in degraded agricultural lands], [establishing marine sanctuaries]. These policies have very high benefit to cost ratios and have implementation plans that are well advanced. Lack of information about these policies in developing countries has been a major barrier to more rapid policy diffusion.

There has been considerable experimentation with new approaches to environmental policymaking. Based on their proven effectiveness where implemented to date, [access to environmental information], [product certification schemes] and [payments for ecosystems services] may be especially worthy of more widespread adoption and continuous evaluation.

There have been many promising efforts to bring environmental considerations into the mainstream of other policy sectors, but there remain gaps. The efforts that policy-makers consider most successful include [having sizable staff dedicated to implementing mainstreaming], [providing clear methodologies for implementing mainstreaming], and [making available operational support to technicians and analysts within other sectoral agencies].

Although there are numerous implementation plans and projects that seek to bridge environmental and development goals, they collectively fail to specify strategies for scaling up to meet global goals. For example, Local Agenda 21 plans are arguably the most successful outcome of the Rio Earth Summit, yet there is still no plausible strategy or goal to have best practice in urban environmental planning implemented in all cities, despite the realization that almost 50% of people will live in urban areas by [2010].

The current institutional framework lacks the holistic approach needed to address complex cross-cutting issues that characterize environmental concerns. Environmental agencies tend to be understaffed and under-funded for the massive challenges they are facing. Other sectoral agencies rarely employ environmental specialists or provide adequate funding to thoroughly integrate environmental considerations into their operations. For example, ministries of public works could build climate change adaptation into their strategies and work plans and climate-proof infrastructure, such as roads, but do not have the expertise to interpret the findings of coupled climate-oceanic models or to modify engineering design parameters based on probabilities of increased extreme weather events.

Investment in basic environmental monitoring is far below what is needed to carry out precise diagnoses or to track policy implementation. For example, it is not possible to track changes in soil fertility, ground water volumes, or land cover in a consistent way across the world. At the global level, approximately [US\$ 65 million] annually is spent monitoring air, water, land and biodiversity. To monitor these areas effectively, investments on the order of [US\$ 500 million] per year is required.

1 Synthesis of the Policy Landscape

1.1 Premises (0.5 pages)

By mapping the current policy landscape, the intention is to demonstrate that the critical thematic and cross-cutting issues addressed in Chapters 2-8 are not inevitable outcomes of development but rather they can be, and some have been, addressed by appropriate policies and effective institutional arrangements. All nations can learn from each other, despite their social, cultural, and historical differences, and that global best practice in environmental policy provides a critical set of policy choices from which nations can choose and adapt to their national circumstances. By providing such policy choices, the intention is to convey the sense of urgency needed to address the environmental priorities described in earlier chapters of the Report and to influence governments and other stakeholders to undertake proactive, urgent action consistent with their own circumstances. There is an abundance of good policies that face difficulties in implementation due to weak or inadequate institutional set ups and capacity, demanding a careful analysis of the linkages between policies and institutions. A further underlying premise is that there is a cause-effect chain linking multilateral global and regional environmental agreements, national legislation, regulations and standards, and action at the local level. By examining the points on this chain where implementation seems to falter most consistently, guidance can be provided for remedial action. Voluntary agreements, local actions and partnerships are new modes of policy implementation that may be even more effective and socially acceptable in some situations than top down policies. Environmental policy is embedded in a rich mix of policies for all sectors and often there may be conflicts with sectoral policies (and less often synergies) and the chapter examines how best to address such conflicts and to promote greater harmonization and synergy across the policy landscape. The distribution of costs and benefits of policies are often not equal and there are winners and losers, so issues of power, equity and gender differences must also be addressed.

1.2 Environmental Performance Review (2 pages)

Drawing from Chapters 2-6, provide a brief synthesis of progress with respect to goals, implementation plans, and actions concerning high priority issues. (reference the OECD performance review format). Attempt to answer the question “have adequate policies, plans, and actions already been put in place to achieve the global, regional and subregional goals set?” One possible tool to identify the critical gaps is a matrix format or report card which will be presented in a summarized form at the beginning of this section. The report card will have greatest relevance where there are appropriate institutional responsibilities for acting on the patterns revealed. The report card will cover:

- 1.) Status of policies, strategies, and targets
- 2.) Extent of consensus
- 3.) Form of policies, strategies, and targets (including time and scale)
- 4.) Supporting institutions/implementation plans
- 5.) Actions and adequacy to meet targets

In addressing the adequacy of responses to date, the following aspects will be examined:

- 1.) Identification of critical gaps and weaknesses with respect to high-priority issues.
- 2.) Demonstrable effects of current policies [successes and failures]
- 3.) Identification of any important issues not currently on the global or regional agendas

1.3 Synthesis of Crosscutting Issues (2 pages)

Provide a synthesis of the Chapter 7 and 8 linkages and crosscutting issues, covering the following questions:

- a. Does policy-making adequately take into account the links between crosscutting issues and the environment?

- b. Are there explicit strategies that take these links into account that have been demonstrated to be effective and possibly worthy of emulation?
- c. Are the multiple policy communities sufficiently engaged in mutual dialogue and what strategies have proven effective in linking environmental decision makers with policy groups responsible for poverty reduction, health, trade, science and technology, governance, and other aspects of socio-economic development?
- d. Are existing institutional mechanisms adequate to cope with these crosscutting linkages and what are some examples of institutional mechanisms that appear to work?
- e. Where are the investments going in addressing such crosscutting issues, and are they adequate?

These two sections (10.1.2 and 10.1.3) should then combine to answer the question, “has the policy response been adequate to address the priority global environmental issues and their linkages, and if not, what are the main gaps?”

2 Emerging Policy Trends (3 pages)

From the synthesis of Chapters 2-6 and their linkages (Chapter 7), draw out the emerging policy trends that have helped to guide the scenarios in Chapter 9 (The Future Today). What promising opportunities for policy innovation/effectiveness, were tested through this scenario approach in terms of their likely impact or effects, and what were the outcomes?

Examine the range of decision-analytical tools and techniques gradually gaining acceptance throughout the world and show how to select the most appropriate tools in varying situations. Describe these tools and techniques in a user-friendly manner, and evaluate some case studies where they have been used. The current state of art of knowledge with respect to the use of green accounting and “macro-ecological” planning as a parallel to macro-economic development planning will need to be assessed.

This section will attempt to answer two questions:

- a. What are the emerging policy trends gaining acceptance throughout the world and how effective are they?
- b. What instruments currently exist to mainstream environmental issues into social, economic, and sectoral plans (including contributions to sustainable development strategies and poverty reduction)?

The following list of items will need to be covered:

- Explain report card patterns
- Promising opportunities for policy effectiveness
- Lessons from the future (drawn in part from the scenarios) regarding promising opportunities
- Quantify the magnitude of likely changes that can be attributed to policy implementation – and describe the main drivers of these changes
- Controllable and uncontrollable factors
- Conditions of success
- Are the scenario outcomes plausible/not plausible?
- Dealing with uncertainty (e.g. adjustable targets)

3 Policy Options for Critical Issues

3.1 Introduction (0.5 pages)

What are the main conclusions and policy findings of GEO-4? How has the environmental perspective been incorporated into development planning and implementation?

3.2 *Emerging Principles and Practice (2 pages)*

Describe emerging principles for environmental governance and action (e.g., precautionary approach, mainstreaming, adaptive management, informational regulation, partnerships etc.). This should be at a level higher than specific policy options, and reflect broad strategic approaches, some of which have already been embodied in MEAs.

3.3 *Adjusting Expectations? (1.5 pages)*

Revisiting the existing goals in time and space (MDGs, WSSD, JPOI, Brundtland) and based on preceding chapters and the scenarios in Chapter 10 is there a need to adjust global expectations or the goals and targets? Would accelerated adoption of environmental policies be adequate and sufficient to achieve global goals and targets?

3.4 *Emerging Policy Options (4 pages)*

Present a comprehensive set of policy options – covering the full range of possible policy responses to the (policy) gaps, and promising strategies for further progress. The range of policy options will be drawn from policies that have been tried in some locations and demonstrated to have been particularly effective. Examples include:

- Informational regulation (e.g. PROPER system in Indonesia)
- Economic instruments (e.g. Carbon taxes)
- Voluntary agreements (e.g. Netherlands Environmental Policy, clean production mechanism)
- Civil society initiatives (e.g.)
- Eco-labelling (eg. Blue Angel, certification schemes for forests, fisheries etc.)
- Private-public partnerships (e.g Equator principles)
- Local Agenda 21
- Corporate environmental and social responsibility (e.g. Global Reporting Initiative)
- Eco-currencies (e.g. Japan)
- Carbon trading (e.g. WB carbon prototype fund, CDCF)
- Developing markets for environmental services and goods (e.g. California wetland swaps, Panama national protected areas system)
- Debt for nature swaps
- Transboundary parks and protected areas (e.g. MesoAmerican Biological Corridor)
- Joint implementation and cleaner development mechanism
- Circular economy (e.g. 3Rs in Japan, and circular economy in PRC)
- Integrated decision making mechanisms (e.g. sector-wide approaches)
- Etc.

Aspects to be covered include:

- cost-effectiveness
- trade-offs (where known)
- synergies
- choke points/catalysts
- social and cultural concerns
- attitudinal changes
- anti doom and gloom approaches

Where appropriate, case studies will be considered to illustrate how such tools can be applied.

3.5 Mainstreaming Policies (2 pages)

Mainstreaming policies into all sectors, with concrete examples and effective tools for mainstreaming. Examples include strategic environmental assessments, cumulative and sectoral planning, environmental auditing, green procurement, integrated economic and environmental planning etc.

4 Policy Implementation Options

4.1 Policy Implementation Challenges (2 pages)

Policies are only as good as their implementation. This section will examine how effective environmental policies are developed and put into action. Special attention will be given to policies that are achievable at low cost but with proven high benefits. Obstacles for more widespread application will be analysed.

The challenges, mechanisms and institutions for integrating environmental concerns into the plans and policies of relevant national sectoral authorities will be assessed.

4.2 Financing (2 pages)

Examine the financing requirements of the most promising policy options, to demonstrate that they are affordable and will have adequate returns. Section should include:

- costs of action, inappropriate action and inaction
- financing mechanisms available, including innovative approaches demonstrated in case studies
- valuing ecosystem services and other non-marketed environmental benefits
- examples of interventions with very high benefit-cost ratio still not receiving adequate investment (e.g. unleaded fuel, mangrove rehabilitation)

4.3 Institutional Frameworks (3 pages)

How can institutions respond to the policy challenges? Institutional mechanisms [mapping what is available (including for policy linkages, monitoring capacity) and what new arrangements seem warranted]. Roles and responsibilities at all levels, including private sector, civil society and other stakeholders, and not just governments.

Evaluate how institutions should respond to (information) gaps and uncertainty, including:

- greater attention to scientific assessment
- explicitly addressing the science/policy interface
- the urgent need to raise public awareness and how to use that awareness to generate political support for environmental interventions.
- capacity building
- knowledge management

4.4 Monitoring and Learning Mechanisms (1 page)

This section will examine various approaches to monitoring the effectiveness of implementation including environmental performance assessment, participatory approaches, self-monitoring, effective learning mechanisms, and environmental audits etc. It will also examine the need for improved science, data, indicators, monitoring and assessment to measure progress towards the environment dimension of MDGs.

5 Final Words

(1 page)

Concluding paragraphs will cover the emerging role of UN agencies and partnerships in promoting effective environmental policies for socio-economic development. The chapter (and hence the Report) will end on a positive note, expressing a pervasive sense of hope and reinforcing the critical need to constantly reinforce the environmental perspective of development, bringing the report back to its launching point – Brundtland 1987.