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Evaluation of the "Global Environment Outlook – 3" report by UNEP

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Udarbejde af : Henrik Saxe, Olivier Rubin and Anja Skjoldborg Hansen

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Environmental Assessment Institute

Linnésgade 18

DK - 1361 Copenhagen K

Phone: +45 7226 5800

Fax: +45 7226 5839

e-mail: imv@imv.dk

www.imv.dk

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G E O - 3

The *Global Environment Outlook 3* report (UNEP 2002a) (GEO-3) was produced in response to the environmental reporting requirement of Agenda 21 and to a United Nations Environment Programme (UNEP) Governing Council decision. The GEO project has two components:

- Global environmental assessment with global and regional sections, capacity building, as well as consensus building on priority issues, and actions through dialogue among policy makers and scientists.
- Printed/electronic reports *to provide guidance for decision-making processes*, as well as web-sites and a core database – the GEO Data Portal.

The GEO-3 project

The GEO-3 report, the 3rd in the series, is the input from UNEP to the Johannesburg summit in August/September 2002. It distinguishes itself from previous publications in two respects: (1) it analyses human vulnerability to environmental change, and more importantly (2) it builds four scenarios for a 30-year future. These aspects, together with the impressive summary of 30 years' environmental development (with regional sections), make the report a valuable publication. Overall, the report reflects the multitude of complex problems and challenges posed by the present global environmental, economic and social state of the World.

Valuable information

However, the GEO-3 report is permeated with statements, implying that nearly all the changes are negative. This is an unfortunate continuation of 'traditional' over-selling of environmental facts by inducing fear. If people and their politicians fear the future, their initial response could be an overreaction, and eventually everyone would become insensitive to real dangers – so *don't cry wolf*. Compiling unrealistically negative scenarios is an inappropriate and outdated strategy in relation to the democratic process of decision making on the path to an environmentally more balanced future.

Don't cry wolf

The GEO-3 report was released by UNEP on May 22, 2002 and was accompanied by a nine-page press release, summarising the main conclusions of the 446-page report. It is safe to assume that most journalists around the world build their stories exclusively on this summary. A majority of the articles reviewing the GEO-3 report, *e.g.* those in *The Guardian*¹, *The Independent*²³ and *New York Times*⁴, contained none or

GEO-3 in the media

¹ http://www.guardian.co.uk/uk_news/story/0,3604,720485,00.html

² <http://www.independent.co.uk/story.jsp?story=297235>

only a few paragraphs taken from additional sources. The views and the emphasis of the press release were therefore crucial in determining how the World came to view the State of the World according to GEO-3.

The nine-page press release reflects the general trend of the full report: environmental issues and threats aimlessly compiled in a long list of problems put into four more or less unrealistic scenarios that do not yield substantially different results. Moreover, the large number of brief quotes selected from the full report for the press release resulted in a confusing lack of coherence that tends to be misleading. At the same time, the press release suffers elemental errors, *e.g.* missing words, which obscure the meaning⁵, and a conflicting use of units⁶.

The press release

In conclusion, the media evaluated the GEO-3 report based on a rather fragmented press release. As a consequence, the public was uncritically presented to a meaningless list of problems with little sense of possible actions and positive future aspects. In other words, the press material, just like the report, encouraged the press to 'cry wolf'.

The public view

The GEO-3 report was edited based on input from some 1.000 individuals and 40 institutions from around the world. This guaranteed a comprehensive and complex input, but, on the other hand, made it correspondingly difficult for the concluding GEO-3 chapter to suggest focused policies and actions. By this, the report partly fails its goal - to "provide guidance for decision-making processes".

Difficult to focus

In view of this, the *Environmental Assessment Institute* has analysed the GEO-3 report and some of its background material to:

Suggested improvements

- Question UNEP's choice of rather *unlikely* scenarios (chapter 2)
- Remind the readers of some of the positive aspects of change (chapter 3)
- Suggest a procedure for prioritising the multitude of problems/ challenges presented by the GEO-3 report by setting up criteria for problem recognition (chapter 4).

³ <http://www.independent.co.uk/story.jsp?story=297956>

⁴ <http://query.nytimes.com/search/abstract?res=F60B17FF355C0C708EDDAC0894DA404482>

⁵ (UNEP 2002b) p 4. paragraph 10 and 12

⁶ (UNEP 2002b) p. 4, bottom paragraph

The unlikely scenarios

The GEO-3 report claims to ‘break new ground by using scenario analysis to explore the environmental outlook’.⁷ It also claims that ‘the increasing pace of change and degree of interaction between regions and issues have made it more difficult than ever to look into the future’⁸. But are both of these statements correct?

Correct claims?

One could claim that scenarios are only useful if they describe balanced and realistic futures that allow for future adaptation, ingenuity, innovation and technology, rather than suggesting extreme futures associated with local and global coping capacities that are no better than at present. Although, the future is increasingly more complex to predict, the capacity of computers running improved scenario models may well improve our ability to anticipate and timely counteract future problems.

The four scenarios outlined in chapter 4 of the GEO-3 report ‘Outlook 2002-2032’ are narrative, i.e. qualitative storytelling.⁹ “Scenarios are descriptions of journeys to possible futures ... they do not predict ... rather, they paint pictures of possible futures and explore the differing outcomes that might result if basic assumptions are changed”. The report uses the main conclusions from these narratives as assumptions, based on which quantifiable models produce estimates of the future.

Narrative scenarios

The Security First scenario describes a rather bleak future characterised by war and chaos – ‘Hell-on-Earth’. Rising social, environmental and economic tensions have resulted in increased violence around the world. Outbreak of several conflicts is thus inevitable, and many of these conflicts are resolved using military force in the form of chemical and biological weapons. Following the dominant ethos at this time, people believe that only at the expense of others will you and your kind survive and flourish.

1. Security first

In a contrasting second scenario – Sustainability First – people everywhere embrace the idea of a “new sustainability paradigm that promises to transcend conventional values and lifestyles”...“The values of simplicity, co-operation and community begin to displace those of consumerism, competition and individualism. More time is spent

2. Sustainability first

⁷ (UNEP 2002a) page xvii

⁸ (UNEP 2002a) page xxvi

⁹ (UNEP 2002a) page 320

on study, art hobbies and engaging in the wider community".¹⁰ Would this be 'Heaven-on-Earth'?

In a third scenario – Market First – market forces dominate social and political agendas. As privatisation spreads around the world, the national public safety nets are reduced. It is taken for granted that economic development naturally leads to social improvement. The intrusion of market relations in all aspects of society shatters the safety net provided by kinship relations without replacing them with something else. If environmental concerns – they do exist, albeit on a small scale – conflict with economic interests, the latter usually takes precedence.

3. Market first

Does the GEO-3 report persuade the readers to seriously believe in the 'Hell-on-Earth' or 'Heaven-on-Earth' scenarios? Are there presently any countries in the world where market forces are not countered? And does anybody today believe that economic development for some will automatically lead to social improvement for others? There is no reason to believe that future decision-makers will regress to worshipping free unleashed market forces when this is not the case today. The assumptions of the first three scenarios seem so caricatured, the results so exaggerated, that one could suspect that the authors want us to 'buy' the fourth and last scenario, as the *only* way forward.

Unrealistic scenarios

In the *last* scenario – the *most realistic* – policy instruments effectively counter the market forces. International agreements on environmental and social issues receive much support, and the strengthening of governance institutions makes it feasible to actually implement all 'necessary' standards. The environmental goals – climate stabilisation, improving eco-efficiency, and reducing toxic wastes – are achieved by restructuring the national tax systems and subsidy programmes.

4. Policy first

UNEP acknowledges that the GEO-3 scenarios are ideal archetypes and that they are therefore neither mutually exclusive nor evenly distributed across the world. Instead, they can be used to spark a debate as to which direction we wish our future to take. *So what is the problem?* UNEP has – at least in part – succeeded in sparking a lively debate.

In the *policy first* scenario – the one UNEP seems to recommend - there is no useful information as to the costs and benefits of choosing between alternative policy op-

Problems

¹⁰ (UNEP 2002a) page 346

tions. The vague recommendations¹¹ of what needs to be done (e.g. 'strengthening international environmental legislation and compliance') leave the readers in the dark when it comes to the estimated costs of various solutions.

There are several problems in using *extreme* scenarios. One is that they encourage a simplistic debate – a debate where fear of chaos may lead to premature conclusions, overreaction, and inefficient solutions. The use of extreme scenarios, as in the GEO-3 report, may serve to scare rather than inform people, which may not be the best route to a better World.

Applying *one-dimensional* and *extreme* scenarios may in itself represent a methodical problem. Since all four scenarios are exaggerated and, in the real World, never live independent lives but interact in co-existence, it is safe to assume that the chosen scenarios are not sufficiently complex and realistic to give a valid description of the future. The conclusions may even be misleading.

For future studies, scenarios should represent a more *realistic balance* between all elements. Focus could then be put on studying interactions of *realistic levels* of the elements included. Instead of just being intimidated by extreme scenarios, people and their governments should be more concerned with the optimistic aspects of the matter – the *possibilities* imbued in change - without neglecting the problems. The road to the future is not a predestined straight line – it is influenced by the choices (right or wrong) we make today but also by the ingenuity and innovations of tomorrow.

Stay with realism

Another problem with *exaggerated* scenarios is that they tend to come dangerously close to a tautological logic. The environment indicators in the model deteriorate because environmental deterioration is an integrated part of the underlying story.

Tautological logic

The output values of most of the few UNEP indicators are surprisingly similar in all four scenarios (Table 2-1) considering the extreme assumptions underlying the different simulations. Many of the results only exhibit a negligible difference between the 'worst' and the 'best' UNEP scenario.

Surprising similarity

¹¹ (UNEP 2002a) chapter 5

Table 2-1. GEO-3 global indicators used to describe the Global environmental future by 2030 (UNEP 2002a)

Global indicators	Sustainable	Security First	Markets First	Policy First
Carbon dioxide emissions / climate	Aggravated	Aggravated	Aggravated	Aggravated
Extent of built-up areas	Aggravated	Aggravated	Aggravated	Aggravated
Land impacted by infrastructure	Aggravated	Aggravated	Aggravated	Aggravated
Nitrogen loading	Aggravated	Aggravated	Aggravated	Aggravated
Water stress	Improved	Aggravated	Aggravated	Improved
Hunger	Improved	Improved	Improved	Improved

As an example, the extent of built-up areas in 2032 only varies from a little more than 3 percent to a little less than 4 percent of the total land area in the worst and best case, respectively.¹² In the case of global warming, by 2032 there is still little difference in global temperature between all scenarios, and the changes predicted to occur after 2032 must be quite uncertain, because likely new technologies were not considered.¹³ The small differences in the outcome of the selected extreme scenarios should not be used as an argument for not taking action, but only as an incentive to carry out cost-benefit and cost-efficiency analyses before appropriate responses are decided upon. Environmental expenses must be seen in relation to all other expenses, such as social-, educational-, and health-related expenses, as well as sustainability.

Examples

The similarity of results calculated from the four UNEP scenarios undermines the image of a World at an all-important crossroad where choosing a wrong path could lead to eminent disaster. In the UNEP scenarios all roads seem to lead to Rome although they might drop you off in slightly different parts of the city. UNEP explains the quite similar outcomes with the fact that much of the environmental change that will occur in the next thirty years is the result of past actions, while the actions taken the next thirty years will not be apparent until long afterwards.¹⁴ But why then construct scenarios that describe a future that has pretty much already been determined by past choices, instead of predicting the result of optional future policy interventions combined with the use of a sufficient time span to reveal their effects? Ultimately, it is the latter that is relevant to policymaking of today. And as stated before, future adaptation, ingenuity, innovation and technology may be expected to improve

Do all roads lead to Rome?

¹² (UNEP 2002a) page 353

¹³ (UNEP 2002a) page 352

¹⁴ (UNEP 2002a) page 395

the global development for humans and for the environment in the coming thirty years, as they have during the past thirty years. Examples of problems that were dealt with successfully include significant reductions in lead emissions from traffic, ozone-depleting CFCs, and industrial emissions of sulphur oxides.

In all four GEO-3 scenarios the majority of indicators are deteriorating (Table 2-1). Thus, the UNEP outlook, with its different set of indicators, has something in common with other pessimistic forecasts. In the Club of Rome's 'Limits to Growth' (Meadows et al. 1972), and in the 'Global 2000 Report' (Barney 1980), the population level, food production, and industrialisation were predicted to first grow exponentially only to overshoot and collapse during the 21st century.

Pessimistic outlook

None of the four paths presented by UNEP's GEO-3 report seem to be sustainable – though some are worse than others. The apparent paradox of going down even a sustainable path and ending up with a World more deteriorated than today could – as discussed above – be explained by the lag between policy implementation and outcome. However, the paradox could also be explained by the limited choice of indicators.

Usually, predictions of the World's future would be based on a different set of indicators than the ones used in the GEO-3 report. In 'Limits to Growth' (Meadows et al. 1972) emphasis was clearly on the world's physical limits in regard to non-renewable resources, agricultural production and excessive pollution. Among other things, it was predicted that many of the vital minerals would be exhausted before 2000. Even though many of these central predictions now seem to be off the mark,¹⁵ the indicators were at least highly relevant for the welfare of future generations, including predictions of a future collapse of the World's economy, rising death rates and a depletion of the World's resources. Maybe the environmental perspective should no longer be viewed out of context with human welfare, when the goal is to predict the future state of the World. All is connected and interact.

Out of context

In a recent publication the Intergovernmental Panel on Climate Change (IPCC) presented 40 scenarios predicting the future by 2100 (IPCC 2000). Focusing mainly on global warming and emissions, the IPCC-report clearly has a much more limited

IPCC scenarios

¹⁵ (Meadows et al. 1972) 'Vital minerals such as gold, silver, copper, tin, zinc, mercury, lead, tungsten and oil should have been exhausted by now' (p. 58), 'we should be faced with a desperate shortage of arable land and rising food prices' (p. 51-52), and 'our health should be undermined by an exponential increase in pollution' (p. 69).

scope than the GEO-3 report. Nevertheless, the IPCC scenarios actually produce some much more relevant sustainability indicators. Among other things it is expected that the gross world product will be somewhere between 10 and 26 times higher than today's value,¹⁶ while the global population even by the highest projections will 'only' increase 3 times to 15-18 billion people by 2100.¹⁷ The World will experience narrowing income differences and the effect of this convergence of regional per capita will have indeterminable consequences for the emission of greenhouse gases in the long run.¹⁸ The global forest area is expected to decrease for a while but in most scenarios the trend is reversed often resulting in larger areas covered by forest in 2100 than today.¹⁶ Thus, even though the World will certainly face serious environmental problems in the future with regards to global warming, the World will be 10 times as rich and more equal – even in the worst-case scenario.¹⁶

Together with the World Energy Council, the United Nations Development Program (UNDP) recently published a report containing six energy scenarios for the World in 2100 (UNDP 2000). The indicators in these scenarios (Table 2-2) outnumber the ones in GEO-3 (Table 2-1), and are more applicable in a sustainability debate. Even the *worst-case scenario* for 2100 (Table 2) has a brighter outlook for the state of the World than GEO-3.

UNDP scenarios

One could argue that the global indicators used in the UNEP outlook are inadequate to describe the environmental state of the World – and not very important indicators for sustainability. Important environmental indicators seem to be missing in the global perspective, e.g. biodiversity, deforestation and soil degradation, though they may be present in local contexts. Perhaps that is the reason why UNEP cannot project whether or not the major global ecosystems will be seriously affected. As a matter of fact the GEO-3 report does not even engage in the subject of sustainability, even though this question is of paramount importance for most future predictions. Most of the UNEP indicators are too peripheral to be of significance in a sustainability debate. And as discussed above, they often respond in a similar manner in all four UNEP scenarios (Table 2-1).

Choice of indicators

¹⁶ (IPCC 2000) page 6

¹⁷ (IPCC 2000) page 5

¹⁸ (IPCC 2000) page 11

Table 2-2. UNDP-indicators describing the future of the Earth year 2100 – (UNDP 2000)

Global indicators	Best-case scenario ¹⁹	Medium-case scenario ²⁰	Worst-case Scenarios ²¹
Eradicating poverty	Improved	Improved	Improved
Reducing relative income gaps	Improved	Improved	Improved
Providing universal access to energy	Improved	Improved	Improved
Increasing affordability of energy	Improved	Improved	Improved
Reducing adverse health impacts	Improved	Improved	Improved
Reducing air pollution	Improved	Improved	Improved
Limiting long-lived radioactive substances	Improved	Aggravated	Aggravated
Limiting toxic materials	Improved	Improved	Aggravated
Limiting greenhouse emissions	Improved	Improved	Same
Raising indigenous energy use	Improved	Improved	Aggravated
Improving supply efficiency	Improved	Improved	Improved
Increasing end-use efficiency	Improved	Improved	Improved
Accelerating technological diffusion	Improved	Improved	Improved

While the GEO-3 report (UNEP 2002a) takes a negative view on indicators such as extent of built-up areas and land area impacted by infrastructure, most other UN-organisations (UNDP, WFP, UNICEF etc.) would interpret an improved infrastructure in the developing countries as a much needed positive development. For example, a more developed infrastructure could provide farmers with better access to markets or a faster relief response in emergency situations (e.g. earthquakes, flooding or epidemics). To UNEP the above two indicators mostly spell problems – which is a rather one-sided, ‘nature-first’ view, failing to consider mediating factors such as the legal system, the degree of internalisation in the economy, the coping capacity of the state or region and opportunities offered by new technology.

Differing perspectives

GEO-3 does not predict whether people have access to clean water or not. Instead, it predicts whether people will be born in countries with water stress. However, that is not necessarily a problem, since all countries (save Kuwait) can supply enough drinking water for individual use, and a scarcity of water for agriculture cannot challenge food security since food can be imported (as in Japan). The relevant indicator for water seems to be access to water. The UNEP approach is equivalent to applying an indicator like food production in a country relative to its population, when the

Examples

¹⁹ Renewables and a phaseout of nuclear energy 2100.

²⁰ Vigorous economic development and rapid technological improvements.

²¹ Intermediate economic growth and modest technological improvements.

relevant indicator would be the number of malnourished people. UNDP estimates that in the last thirty years, the share of rural families with access to safe water has grown more than fivefold.²² More detailed examinations conclude that in the period 1980-1990, 1.3 billion people gained access to water, while a further 800 million people gained access in the period 1990-2000, thus leaving 82 percent of the world's population with an improved access to water (Gleick 1993; WHO 2000). Water stress could mean reduced agricultural production and desertification – but it does not equate hunger or measure the degree of desertification.

The main conclusions from the four narrative scenarios are used by UNEP as assumptions for quantifiable models. UNEP sees the World from the perspective of the environment, even though they do mention social and economic aspects. The results of the UNEP models therefore differ from the results of other models (*e.g.* Table 2-1 versus Table 2-2). This is mostly because of missing indicators in the UNEP scenarios – missing in the sense of considering human welfare and broader aspects of balance and sustainability in the global natural environment. UNEP also applies fewer environment indicators than is typical for other similar scenarios. The UNEP scenario results are inconclusive on several important aspects of our future global environment, thereby rendering a relatively moderate input to the present environmental debate. There is a need to include more indicators and a need to prioritise solutions to the multitude of problems (see chapter 4 of this report).

Few indicators

The limited choice of 'nature-first' indicators selected for the GEO-3 Outlook results in a rather unfortunate fear-inducing report. It is a fact, that this planet is populated by humans – so humans will necessarily affect the environment. It is the job of all nations to improve life quality for all humans, while at the same time securing a healthy environment for all living beings – animals and plants of the multitude of global ecosystems. This is not achieved by trying to force a no-change-policy for the natural environment. Changes are indeed a vital and innate part of the natural environment, as long as these do not happen too abruptly and they are not irreversible declines of key elements. Changes may serve humans in a way that eventually also improves the environment more than a Global State of no-changes.

Conclusions

²² (UNDP 2001) page 10

Positive aspects of change

Change *per se* is *not* a problem – it can imply something positive, something negative, both, or something of insignificant value. As an example, *an increasing proportion of Earth is affected by human activity*. But is that a problem – or not? In Denmark 100% of the land area is affected by human activity, and yet Danes find it most charming – with cities, agricultural fields, forests, lakes and beaches. The meaning of the word ‘change’ must be qualified and quantified to have meaning. The GEO-3 report often focuses on the *negative* sides of change. In this chapter, some frequently ignored *positive* sides are mentioned in three examples.

Change – no problem

The ‘products’ responsible for *air pollution* are mostly indispensable parts of ‘civilisation’ as we know it today. There is a continued effort to minimise the negative effects of air pollution, and there are some less talked about and less important positive aspects of air pollution. Further, there is often confusion whether negative aspects concern man or nature.

Air pollution

Negative aspects of air pollution	Positive aspects of air pollution
To humans, the most toxic aspects of air pollution are consequences of tobacco (WHO 1999), indoor fires for cooking and heating, ²³ very fine particles from diesel vehicles (Palmgren et al. 2001), asbestos (IFBWW 2000), ground level ozone (asthma (McConnell et al. 2002)), and substances causing break-down of stratospheric ozone (skin cancer (Leffell 2000)). SO ₂ + NO _x pollution from industry and transport caused acid precipitation harmful to sensitive freshwater and terrestrial ecosystems, but much less toxic for humans (U.S.Environmental Protection Agency 2002). Acid emissions are significantly reduced in recent decades.	Gaseous S- and N pollutants fertilise extensive agricultural areas, e.g. in the mid-west USA or even in the UK (Zhao et al. 2001). CO ₂ is a significant component in all plant growth, and may be responsible for the steady increase in forest growth e.g. in Europe (Menzel & Fabian 1999). Climate change induced by greenhouse gases is likely to increase food production in many regions (Parry et al. 1999) and forest growth (Saxe et al. 2001) in large regions. N-containing air pollution will continue to have a positive influence on forest growth in areas where it is a limiting factor (e.g. pine forests in SE USA(Oren et al. 2002)). Sulphur emission significantly counteracts the greenhouse effect, reducing global heating (Kiene 1999).

Economic growth has caused environmental degradation in many regions, but it has also been the prerequisite for increasing the coping capacity of people and nations. As quoted in the GEO-3 report²⁴, the coping capacity is a combination of all natural and social characteristics and resources available in a particular location that are used to reduce the impacts of hazards. These include factors such as wealth, technology, education, information, skills, infrastructure, access to resources, and management capabilities. Between two and three times as many disaster events were

Coping capacity

²³ (UNEP 2002b) page 218, 221-222, 228

²⁴ (UNEP 2002a) page 303

reported in the US in 1999 as in India or Bangladesh but there were 14 and 34 times more deaths in India and in Bangladesh, respectively, than in the US (UNEP 2000).

Using information of this kind, the GEO-3 report could have discussed whether allocation of funds gave most value to humans and their environment when invested in, e.g., CO₂ reductions or in increasing the coping capacity of societies. What would people living in the developing World and people in the industrialised countries prefer? What would be the most cost-effective? The GEO-3 report suggests we investigate cause-and-effect linkages in human vulnerability to environmental change, to improve system modelling and sensitivity analyses and to develop more 'early warning' approaches²⁵. A simple reduction of CO₂ emission may not help these efforts; on the contrary, it may hurt productivity if not carried out in a sensitive manner. A rhetorical question would be whether it would be better to prioritise increased combustion efficiency over reduced activity in industry and transport.

As a third topic we consider *deforestation*. There is often confusion about the causes of deforestation. Air pollution and climate change are frequently quoted as major causes of forest decline. While air pollution has damaged significant areas in central Europe and in China, these areas are recovering with the introduction of clean-air policies. While a temperature increase may increase forest fires in some regions, it also stimulates general forest growth, and allows the global forests to move northwards into the vast arctic regions (Saxe et al. 2001). To a point, death in one region means life in another. The main cause of deforestation in the developing countries is typically population pressure (Booth et al. 1999; Ravindranth & Sutherland 1998).

Deforestation

To allow the average reader to form a balanced outlook, it is necessary to include both the negative and positive sides of change and to exclude relatively unimportant changes. UNEP did not sufficiently go through this exercise in their GEO-3 report.

Conclusion

²⁵ (UNEP 2002a) page 314

Criteria for recognising major problems

It is not a new idea that interaction between people and the environment is complex. Human activity impacts on the environment, and sometimes poses a threat to the ecosystems of undisturbed forests, landscapes, oceans, lakes and rivers. At the same time, people depend on environmental services such as food, energy resources and in obtaining a healthy, fulfilling life. Some consequence of human presence is inevitable, and will constantly change our environment. The question is how severe consequences for the environment we are willing to accept in order to achieve certain benefits for man. How capable of maintaining vital biological functions are the various ecosystems, and how will the induced changes affect the livelihood of future generations? Sometimes, it is uncertain how much a given disturbance can be reduced through presently available preventive measures, and subsequently how we identify the most relevant measures.

People vs. environment

There is often a conflict between poverty/development and environmental protection. UNEP's ambition is to decouple poverty/development from environmental degradation. UNEP remains convinced that it lies well within the scope of human determination and ingenuity to come up with appropriate policy packages and technologies and use these to ensure that fundamental environmental conditions can and will steadily improve, not worsen²⁶.

Poverty

The GEO-3 report lists a vast number of potential, existing and future disturbances to the environment and human health on both global and regional scales. But the disturbances and their potential solutions are not prioritised, which leaves readers and decision-makers with little or no guidance. What are 'big' problems, and what are 'small' problems? A list of 10 environmental problems is given in the conclusions of the GEO-3 report, chapter 2. These 10 problems are of very different magnitude and importance, and the potential preventive measures are not summarised in the report. Are these 10 problems the most important environmental problems in the World?

Many problems

²⁶ (UNEP 2002a) page xvii

Table 4-1. List of 10 environmental challenges from GEO-3.

	GEO-3 global problems ²⁷	Consequences
1	Greenhouse effect	<ul style="list-style-type: none"> • Increased temperature • Change in ocean currents • Climate change • Floods, disasters • Sea level rise • Habitat losses • Increased productivity
2	Air pollution	<ul style="list-style-type: none"> • Respiratory and cardiac problems • Asthma
3	Loss of surface waters/ lack of drinking water	<ul style="list-style-type: none"> • Drought • Loss of biodiversity • Water related diseases (bacteria and parasites from untreated water)
4	Biodiversity loss	<ul style="list-style-type: none"> • Loss of genetic variation • Loss of key species and ecosystem function
5	Exploitation of fish stocks.	<ul style="list-style-type: none"> • Crashing fish stocks • Loss of edible species
6	Land degradation.	<ul style="list-style-type: none"> • Loss of arable land • Loss of biodiversity
7	Deforestation.	<ul style="list-style-type: none"> • Loss of biodiversity • Reduced carbon retention • Reduced water and soil conservation and purification
8	Nitrogen pollution	<ul style="list-style-type: none"> • Acidification • Eutrophication • Fertilising and changing natural aquatic systems • Loss of edible species • Toxic algae blooms
9	Urban air and water	<ul style="list-style-type: none"> • Health threat to urban dwellers • Environmental threats in untreated effluents and emissions
10	Disasters	<ul style="list-style-type: none"> • Drought • Hunger • Deaths • Deforestation • Floods

²⁷ NB: Global problems referred to in the GEO-3 report. For the full description, see (UNEP 2002a) page 298

What is the relative importance of the issues in this list? What are our options to improve the situation? Again, the lack of interpretation leaves the reader with the impression of an overwhelming number of very severe environmental threats.

In addition to the list of problems, we have attempted to provide *examples* of causes and associated preventive measures for each of the 10 problems, since we find that such are missing (Table 4-2). The preventive solutions are classified as being either mainly dependent upon technological advancements (T), economy (E) or politics (P).

Causes and solutions

From the short list of solutions to some of the environmental problems, we conclude that most of these problems can presumably be solved using current knowledge and technology, and thus only depend on political will and initiative (water management, wetland and forest protection etc). A few problems, however, depend on the development of new technology for a proper solution (cleaner technologies for combustion etc). This type of information is important to policy makers, as is the recognition that some solutions are very expensive (reductions in greenhouse gas emissions). Such considerations, together with a prioritisation of the problems, would lead to more efficient decision-making and should probably have been included in the GEO-3 report.

Political decisions

The reasons for *not* providing clear priorities could be that strongly diverging political ideologies in different parts of the world (north-south, rich-poor, etc.) and conflicts between the strongest anthropocentric views and the strongest 'nature-first' views (Ferry 1998) have made consensus an impossible part of GEO-3. Being political in nature, such priorities were probably never even intended to be included in the report. However, consensus is hoped and planned for at the Johannesburg Summit, and the planned discussions between delegates would have been further aided by UNEP if the GEO-3 report had included suggestions for *criteria* for recognising the most important problems and their solutions. But such suggestions are missing. When these are absent, important problems risk drowning in the multitude of problems.

Conflicts

Which problems are important, and which are not? For the Johannesburg Summit, defining the *criteria* for this selection would establish the necessary game rules, and bring counter-views out in the open, instead of keeping them buried in the complexities of environmental interaction, multiple problems, and vague formulations. The conflicts would be spelled out, and the challenges of dealing with the most

Need for criteria

Table 4-2. Causes, preventive measures and solution type

	Name	Cause	Preventive measures	28
1	Greenhouse effect	<ul style="list-style-type: none"> Emission of greenhouse gasses 	<ul style="list-style-type: none"> Reductions in greenhouse gasses emissions Increased carbon retention Increased coping capacity Infrastructure, wealth 	T/E E P
2	Air pollution	<ul style="list-style-type: none"> Fossil fuels 	<ul style="list-style-type: none"> Cleaner technologies Reduced fossil fuels Restrictions on POP 	T T/E P
3	Loss of surface waters/ lack of drinking water	<ul style="list-style-type: none"> Water overexploitation, poor water management Untreated sewage 	<ul style="list-style-type: none"> Wetland protection/restoration Water management Waste water treatment Sanitation 	P P P P
4	Biodiversity loss	<ul style="list-style-type: none"> Loss of habitats (forest, wetlands) Urbanisation Human development Climate change 	<ul style="list-style-type: none"> Protected areas Management of constructions 	P P
5	Exploitation of fish stocks.	<ul style="list-style-type: none"> Overfishing 	<ul style="list-style-type: none"> Better resource management Increased knowledge 	P T
6	Land degradation.	<ul style="list-style-type: none"> Poor agricultural practice Overgrazing Urbanisation Underlying: poverty, population growth 	<ul style="list-style-type: none"> Better practices Reduction in poverty Reduction in fertiliser use 	P P T/P
7	Deforestation.	<ul style="list-style-type: none"> Overharvesting wood Overgrazing Underlying: poverty, population growth 	<ul style="list-style-type: none"> Natural forest protection Sustainable forest management Reduction in poverty 	P P P
8	Nitrogen pollution	<ul style="list-style-type: none"> NO_x emissions Fertiliser use 	<ul style="list-style-type: none"> Reductions in fossil fuels Reduction in fertiliser use/loss More wetlands (natural water treatment) 	T/E T/P P
9	Urban air and water	<ul style="list-style-type: none"> Urbanisation in combination with poverty 	<ul style="list-style-type: none"> Reduction in city development Increased wealth Democracy 	P P P
10	Disasters	<ul style="list-style-type: none"> Natural occurring + greenhouse effect 	<ul style="list-style-type: none"> Increased coping capacity (wealth, infrastructure) 	P

²⁸ Classification of solutions – whether they are mainly dependent upon political initiatives (P), technological advancements (T) or economical resources (E).

important environmental problems of the World would be made more transparent. Without this deliberate process of defining and agreeing upon *criteria*, subsequent prioritisation will be hindered.

To inspire future prioritisation, we presently suggest *two* discrete lists of ranked *criteria* for selection among the multitude of important global environmental problems, asking the question of which problems to solve first (Table 4-3). One list concerns threats to human survival and welfare ('man-first'), while the other list concerns threats to ecosystem functioning and survival of species ('nature-first'). In this context, 'nature-first' does not mean that changes in natural ecosystems should not be tolerated, only that such changes should not significantly reduce *globalecosystem* functioning and biodiversity. There may be local changes that have no global consequences. The fact that the lists are not identical acknowledges the dispute between environmentalists and development-oriented opinions, and sometimes the 'North-South' differences. More criteria can be added and their ranking be changed, but eventually the two lists must be fused. The lists are meant as an *inspirational tool* for the Johannesburg delegates and for further focusing of future discussions.

Examples of criteria

Once political negotiations has led to agreement on a common priority list for solving the multitude of environmental problems named in the GEO-3 report, the next step is to implement the criteria for prioritising. The prerequisite is that all relevant problems are qualified and quantified with respect to the existing and projected change they induce. Some 'problems' may not induce significant changes, may even imply something positive, or may have unknown consequences. Another prerequisite is knowledge of solutions – technically, politically, practically and economically. The suggested short-list in table 4-3 is not completely ranked, since some criteria can only be viewed jointly.

Prioritising

What are the most important problems to solve: Soil degradation, global warming, clean freshwater, soil pollution, air pollution, deforestation, loss of biodiversity, or...? Based on our suggested criteria lists we will demonstrate how to evaluate the severity of the 10 GEO-3 problems listed according to the 'man-first' and 'nature-first' perspectives (Table 4-1). In this context, we have limited the greenhouse problem to include only the temperature- and sea level rise, since other aspects have their own entry (biodiversity loss, natural disasters, etc)

Most important?

Table 4-3. Quasi-ranked lists of criteria for problem evaluation – for inspiration only

	'Man-first'		'Nature-first'
1	<p>Numbers, functions and irreversibility: <i>Negative effects on large numbers of people or key species or ecosystems beyond recovery that human survival and welfare depend upon.</i></p> <p>Rationale: A problem is more severe if it concerns many people or key ecosystems (e.g. marsh lands), particularly if the induced negative responses cannot be returned to the old (or a new) balance. The decision to act (or not) is final.</p> <p>Example: pollutants, diseases, drought, famine</p>	1	<p>Time- and geographical scale of the problem: <i>A Persistent, global problem will be more severe than a temporary, local problem.</i></p> <p>Rationale: A large geographical scale of a problem increases the number of affected ecosystems. A longer time scale increases the amount of stress on the ecosystem, and greatly reduces its ability to recover to its current or an alternative appropriate state.</p> <p>Example: global habitat losses, global warming</p>
2	<p>Multiple effects and negative interaction: <i>Disturbances that affect humans in more than one way and that interact with other changes in the human environment.</i></p> <p>Rationale: When a given disturbance negatively affects humans in many ways simultaneously, and the effects of the disturbance are negatively enhanced through interaction with simultaneously occurring disturbances, this is more severe than a disturbance which has only one effect on human health and welfare.</p> <p>Examples: wetland losses, NO_x emissions, epidemics</p>	2	<p>Numbers, functions and irreversibility: <i>Negative effects on large numbers of individuals, key species or key ecosystems beyond recovery.</i></p> <p>Rationale: A problem is more severe if it concerns many individuals, key species, or key ecosystems particularly if the induced negative responses cannot be returned to the old (or a new) balance. The decision to act (or not) is final, and the outcome often uncertain.</p> <p>Examples: Widespread persistent pollution, extinct species (keystone species), soil degradation</p>
3	<p>Certainty: <i>Well-understood and contemporary problems should be addressed prior to potential and future problems of similar magnitude.</i></p> <p>Rationale: If we solve well-understood, contemporary problems first, we may later have solutions for potential, future problems.</p> <p>Example: reduce poverty and provide food and water over e.g. CO₂ reductions</p>	3	<p>Multiple effects and negative interaction: <i>Disturbances that affect species, functions or ecosystems in more than one way and that interact with other changes in the environment.</i></p> <p>Rationale: Disturbances that affect more than one species, function or ecosystem and that interact with other changes in the environment cause more serious disturbances.</p> <p>Example: wetland losses, deforestation</p>
4	<p>Ethical, aesthetic and moral environmental problems: <i>Relate to the quality of human life.</i></p> <p>Rationale: Environmental issues may affect our quality of life by other means than physical: we may feel an obligation to preserve ecosystems or species regardless of our physical benefits.</p> <p>Example: protection of specific ecosystems or species, recreational areas, existential values of ecosystems</p>	4	<p>Certainty: <i>Well-understood and contemporary problems should be addressed prior to potential and future problems of similar magnitude.</i></p> <p>Rationale: If we solve well-understood, contemporary problems first, we may later much better understand and have solutions for potential, future problems.</p>

Most important?

Table 4-4. Ordinal score according to the criteria suggested in Table 4-3

GEO-3 problem	Relative score "Man first"	Relative score "Nature first"
1 Greenhouse effect	Medium	Medium
2 Air pollution	Medium	Low
3 Loss of surface waters	High	Medium
4 Biodiversity loss	Low	High
5 Exploitation of fish stocks	Medium	Low
6 Land degradation	Medium	Medium
7 Deforestation	Medium	Medium
8 Nitrogen pollution	Low	Low
9 Urban air and water	High	Low
10 Disasters	High	Low

Table 4-4 demonstrates the different importance of problems when viewed from various perspectives. According to the suggested criteria of Table 4-3, some of the problems are important to human life and well-being, but less important to the environment, e.g. urban pollution and disasters. In contrast, loss of biodiversity is mainly a problem for the global ecosystem but not for human development. Based on our evaluation criteria, acidification and eutrophication are not major threats to the global environment or human interests. We are aware that other scientists or institutions may reach other conclusions based on different criteria. But the point of this exercise is to inspire the politicians towards a clarification of the *criteria* for recognising the most important environmental problems. No political decisions to act or not to act can be taken without an evaluation of the *relative* importance of the problems and the feasibility and cost of the preventive measures. '*Consensus-criteria*' are urgently needed.

Perspective

With a given political decision to restore a given aspect of the environment, cost-efficiency analyses should be performed before policies are decided upon. With an open political situation, cost-benefit analyses are also highly relevant. But as 'man-first' and 'nature-first' lists often compete, such analyses should never pretend to be the sole basis for political choice. This is because the art of cost-benefit evaluation rarely yields scientific absolutes regarding the state of the World, but is always bound by the (lack of) knowledge and cultural preferences of the people in question. A win-win situation must therefore always be attempted with any political choice. Or in other words, all choices should be made with consideration for both strategies, be it 'man' or 'nature', 'North' or 'South', 'rich' or 'poor'. Important examples of this, however, are very difficult to find.

Win-win

One suggestion could be decoupling of development in the Third World from environmental degradation. The 'Global Deal' (The International Institute for Environment and Development 2002) proposal to be presented at the Johannesburg summit aims at this. Innovation and subsequent technology transfer to the third World may achieve such decoupling.

One suggestion

The first step towards an international agreement on which of the many global environmental problems are the most important, and the first to be solved, should be agreement upon the *criteria* for selection of problems – '*consensus-criteria*'. The next step is to ensure that all problems considered are *qualified* and *quantified* as best as possible. The third step is to run all these problems through the list of criteria for *selecting* the most important problems. The final step is to implement solutions. During evaluation all solutions must be evaluated from a technical, a political, a practical and an economical angle.

Conclusion

Final conclusions

The GEO-3 report is a commendable collection of information on a multitude of global environmental-, social- and economic aspects. However, politicians reading the GEO-3 report must make up their minds about a priority of problems and solutions before they can agree on a priority of policies and action nationally and internationally.

Commendable

UNEP fails by their use of unlikely scenarios which apply few and relatively irrelevant indicators of change, and a time perspective too short to see real differences between the chosen scenarios. The report also fails to remind the readers of some of the positive aspects of change. The GEO-3 report indicates seven instruments for action²⁹, but fails to *prioritise* which aspects of global change that must have priority.

GEO-3 shortcomings

What is needed, is a set of '*consensus-criteria*' for recognising the most important environmental problems. The problems need to be prioritised according to the criteria, and detailed cost-efficiency and cost-benefit analyses based on unbiased scientific value assessment are needed to assist in the interpretation of the multitude of scientific and statistical information given in the GEO-3 report.

Prioritising and pricing

The present analysis will hopefully inspire readers of the GEO-3 report – NGOs and politicians alike – to get on the path to creating more focused and all-embracing strategies for a better World.

Important to focus

²⁹ (UNEP 2002a) page 405-410

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