Chapter

5

Beyond DPSIR – Outlook and Other Major Aspects

5.1 Introduction

Aside from documenting environmental state and trends, the Global Environment Outlook (GEO) reports have consistently featured several other lines of analysis. First, there is the Outlook proper, exploring the future some decades ahead and extracting strategic signals. Second, other key themes such as the Earth system, environmental data and options for action were often singled out for special treatment. Third, the regional content in the GEOs has varied greatly from one edition to another. This chapter tells how these three particular lines of analysis evolved in size and role. In addition, it highlights a fourth important category in GEO's global reporting, being the companion products and technical reports. These helped bridge the six major GEO report processes and made GEO more transparent for a broader audience in terms of data, detailed overviews of regional impacts, methodology and network formation. For this fourth category, the current chapter provides an overview only, whereas related Annex IV offers a complete list.

5.2 Evolution of the Outlook component in global GEOs

Embedded in the name "Global Environment Outlook" from the beginning, the forward-looking outlook aspect of GEO reports has always been among the most anticipated and read by a wide variety of readers. This first section of Chapter 5 explores the evolution of the Outlook element in the global GEO series.

Forward-looking analyses developed in a manner that often characterized GEO's style through a learning-by-doing and stepwise fashion. But certain key steps in relation to these future analyses were taken even before the first edition was published. There were many successive battles of opinion between the various teams involved. A prototype global environment outlook was prepared as input for a 1994 meeting in Cali, Colombia, including several entities that later became part of the GEO collaborating centres network run by the United Nations Environment Programme (UNEP). The prototype included thematic projections on climate change and freshwater availability, and these were illustrated via quantified examples for various world regions. However, there was no comprehensive coverage of all regions for all key themes. While this initial Outlook component was praised, it also drew criticism for not providing a full picture of regional challenges whereas, at around the same time, it was becoming clear that the new assessment had a special role to play in illuminating the regional dimensions of global environmental change.

In *GEO-1*, Chapter 4, "Looking to the Future," is a straightforward business-as-usual scenario that essentially shows the magnitude of the world's future environmental challenges if current trends continued (UNEP, 1997c). The model-based analysis clearly demonstrates the integrated nature of the planetary system, along with the need to better study and understand interlinkages between different human aspects such as culture, economy, institutions and society, and environmental themes including biodiversity, climate, land and water.

Already this first report, in all its simplicity, pointed to the potential for action. The last few pages of the *GEO-1* outlook chapter quantify potential environmental impacts of stepped-up policies based on the use of the best available technologies in agriculture and energy, possibly combined with renewable energy sources and changes in the human diet, such as reduced meat consumption. These served as a reminder that positive action is possible and highlighted the risk of growing inequality in a world that is overall

becoming healthier and wealthier. The *GEO-1* outlook was well-received and offered inspiration for its "Executive Summary". At the same time, it was criticized, at least among the GEO team, as being confusingly close to prediction. From this point onward, GEO outlook work evolved, featuring alternative futures and more elaborate options for action.

GEO-2000 strengthened the outlook element in two ways (UNEP, 1999g). First, the new outlook work saw creative involvement of regional teams from the start. Second, paralleling the introduction in GEO of a full-blown policy chapter, the *GEO-2000* outlook work placed alternative policies centre-stage. These two changes entailed a major expansion relative to *GEO-1*.

While *GEO-1* only offered a limited regional flavour in the outlook chapter, particularly in regard to land and pressure on natural habitats, *GEO-2000* offered regional alternative policy studies (Box 5.1.1). Each regional study focuses on one or two environmental issues of particular relevance to the region, such as air pollution or water resources management, combined with specific categories of moderate policy instruments, such as promotion of new technologies or stepped-up voluntary action by the private sector. For the global edition, each regional summary is encapsulated in two or three pages. The choice to focus the outlook work for *GEO-2000* on moderate alternative policies, not on radical scenarios of transformative change, was a compromise. It reflected the capacity of the various regional teams for scenario work at that point in time.

In itself, the *GEO-2000* regional studies produced clear and significant work; for example, the study on freshwater availability in the West Asia region. Its scenario thoroughly analyses to what extent increasingly ambitious mixes of supply technology and rationalization of water use could achieve in terms of the regional water balance. In fact, neither of the scenarios was deemed to postpone by more than a few years the moment when the annual water balances for these areas would become entirely negative. Thus, its message was that without a drastic change in regional population growth, no solution could be imagined.

Here it already became apparent that the logical next step in the evolution of GEO outlook work would be more encompassing scenarios for deeper change. This also points to the benefits for GEO of its regional teams' antennae for issues that could be usefully put on the table, naturally connecting environment and development.

The way regional involvement in the Outlook grew during the production of *GEO-2000* – out of regionally focused scenarios in the absence of a global

framework – made it hard to synthesize the results. There was not much scope for relating findings of one region to those of another or relating the regional to the global. Eventually, to construct the *GEO-2000* outlook chapter while doing justice to regional specificity and the analyses delivered, a global backdrop scenario was invented. This was done after the regional studies had been finalized, each with its own assumptions on, for example, global trade, migration and technology. The backdrop scenario was based on *Bending the Curve*,[1] for lack of more suitable material at that late stage (Raskin et al., 1998).

Box 5.2.1: The scenario process for *GEO-2000*

Regional teams for *GEO-2000* were asked to develop their scenarios without the help of a quantified global framework of interregional linkages as in trade, climate change and technology. The scenarios were to explore the impact of moderate alternative policies, roughly translating as better governance and better technology, for a specific issue of regional importance, amenable to regional policies; for example, deforestation in Latin America or water quantity issues in West Asia (UNEP, 1999b, 1999c, 1999d, 1999e, 1999f). One regional study, namely for Europe and Central Asia on the classic issue of acidification and eutrophication, was elaborated in detail and served as an example (van Vuuren and Bakkes, 1999).

Each regional study comprised six steps as follows. (i) Define the scope of the study and the primary policy question to be answered. For example: "what can be achieved by moderate additional measures and will the achievement be enough?." (ii) Define a reference scenario to describe likely social and economic developments up to 2010, including consistent projections of the key driving forces under current policies; the purpose of the reference scenario is to describe what could happen without alternative or additional policies. (iii) Estimate impacts of the reference scenario in terms of selected environmental issues. (iv) Define alternative policy packages, focusing on physical measures, such as fuel switching, the policy instruments needed to achieve them, such as taxation, or both. (v) Estimate changes in the impacts caused by the alternative policies and compare them to those of the reference scenario. (vi) Draw conclusions about the effectiveness of the alternative policy packages.

[1] *Bending the Curve* was about what would now be called transformative change – a concept that would only make its entry in later editions of GEO. Its global business-as-usual scenario was merely an auxiliary construct – the curve that needs bending. In contrast, what inspired *Bending the Curve* was its policy reform scenarios. Nevertheless, its business-as-usual scenario was a convenient stop-gap for *GEO-2000*.

A central team compiled short standardized summaries of regional scenarios; regional scenarios with insufficient substance were propped up with material from pre-existing studies, as with the Africa region, or dropped, as with the Arctic region, when such material was not available.

Globally, the *GEO-2000* outlook work highlighted three insights:

- time is running out, and environment-related policies are generally moving in the right direction, but much too slowly;
- setting up a well-coordinated global provision of trusted data and information is time-consuming and should be energetically pursued without delay; and
- in various regions of the world, existing environmental issues will change in their nature once a threshold is passed, while old unsolved problems will persist and start interacting with or producing new problems; for example, nutrient loading or air pollution or climate change.

In addition to the alternative policy studies and the backdrop scenario, the "Future Perspectives" chapter in this second GEO report also drew on a one-off exploration of emerging issues for the 21st century. The International Council of Scientific Union's[2] Scientific Committee on Problems of the Environment carried out a survey, to which some 200 scientific experts in more than 50 countries responded. At the time of the launch of *GEO-2000*, UNEP Executive Director Klaus Toepfer noted that poor governance came out as number 5 in a prioritized list of 36 issues – a result he did not expect from scientists!

On balance, while the *GEO-2000* outlook was perhaps not the strongest in the GEO series, it confirmed the standard of GEO having a forward-looking element, now explicitly paying attention to alternative policies. It also saw the emergence and engagement of regional outlook teams and became a natural stepping-stone for much more ambitious outlook work in the preparation of *GEO-3*.

In all probability, *GEO-3* represents the pinnacle of scenario development in the global GEO series, with four full-blown and colourful scenarios (UNEP, 2002e). Thirty years after the Stockholm Conference and ten years after Rio, the "Outlook" chapter examines the 30-year period 2002–2032. *GEO-3*'s retrospective chapters covered the time period 1972–2002, and thus *GEO-3* as a whole provided a balanced look backward and forward.

[2] ICSU, now the International Council for Science

The outlook for *GEO-3* combines descriptive narratives and quantitative approaches by examining four scenarios of potential future development at both global and regional levels. The intellectual basis for this was the work of the Global Scenario Group (Gallopín et al., 1997; Raskin et al., 1998).

- The *Markets First* scenario "envisages a world in which market-driven developments converge on the values and expectations that prevail in industrialized countries."
- In a *Policy First* world, "strong actions are undertaken by governments in an attempt to reach specific social and environmental goals."
- The *Security First* scenario "assumes a world of great disparities, where inequality and conflict prevail, brought about by socio-economic and environmental stresses."
- *Sustainability First* "pictures a world in which a new development paradigm emerges in response to the challenge of sustainability, supported by new, more equitable values and institutions."

The scenarios developed for *GEO-3* have an environmental focus, supported by a host of data and quantitative modelling, together with regional or local examples to explain their relevance on the ground. At the same time, they recognize that the environment cannot be discussed without also considering what may be happening in the social and economic spheres. Therefore, they span eventualities in many overlapping areas, including culture, demography, economic development, human development, science and technology, governance and, of course, the environment itself.

While the four *GEO-3* scenarios were meant to differ strongly from each other in terms of physical trends and public mood, the environmental changes projected within each one for the first two decades are not so different. This is a reminder that many changes that will occur in the future have already been set in motion today; for example, through present population dynamics, power infrastructure, the layout of cities and tax rules. By the same token, it was also a reminder of the time lag between the introduction of policy responses now and eventual effects on the environment and society in the future. This was the central message that the journal Nature picked up from *GEO-3* (Gewin, 2002). For many issues, such as climate change or biodiversity loss, the divergence of trends under the different scenarios' policies does not become apparent until observed over a significantly long time.

Perhaps the most important result of the *GEO-3* scenario work is that it convincingly framed the future of the global environment as a social and economic development imperative. Much more than a classic state of the

environment report could do, it enabled UNEP to describe global care for the environment in the context of the sort of society we collectively wish to develop and to maintain. This outlook, while concluded in 2002, offered an early foreshadowing of the 2015 Sustainable Development Goals (SDGs) (UNGA, 2015).

Most long-term participants in the global GEO reporting process and most end users of the reports were probably more enthusiastic about and impressed by the four *GEO-3* scenarios than any of the other GEO outlooks. Regional and global workshops were instrumental in putting *GEO-3*'s scenario analysis on track. They were lively and fed with inputs from various sources, more so than previous GEO editions.

While *GEO-3* outlook work generated considerable enthusiasm and admirable outputs, it also brought ample headaches for the compilers. In particular, issues around the chosen data had to be solved. There was persistent disagreement over whether the numbers that had been discussed earlier in regional scenario workshops should be kept for the global *GEO-3* scenarios. As an alternative, the global environmental impact analysis could use a consistent, modelled basis to consider the effect of global linkages such as trade, technology diffusion and climate change. The eventual outlook chapter of *GEO-3* quotes data from both approaches, but the regional impact analysis is model-based (Box 5.2.2).

Box 5.2.2: Scenario multi-team set-up in *GEO-3*

Four modelling teams contributed the quantitative analyses of the *GEO-3* scenarios:

- Polestar team at the Stockholm Environment Institute in the USA
- The team at the National Institute for Environmental Studies in Japan
- IMAGE team - Integrated Model to Assess the Global Environment – at the National Institute for Public Health and the Environment (RIVM) in the Netherlands
- The modelling team at the Center for Environmental Systems Research at the University of Kassel in Germany

Each of these covered a specific environmental impact across the four scenarios. For example, the modelling team at the National Institute for Environmental Studies provided all projections for urban air pollution, and the modelling team of the University of Kassel covered water stress for all four scenarios (UNEP, 2002e, pp. 398–400 outlook Technical Annex).

This differed from the arrangement for the Assessment Report of the Intergovernmental Panel for Climate Change at that time, as each of its four scenarios was provided by one analytical team, complete with all the environmental numbers (IPCC, 2000). The GEO arrangement turned out to offer better possibilities to check consistency across the models involved.

Making good use of the arrangements between the analytical teams, a technical background report to the outlook segment of *GEO-3* provided wall-to-wall details of all issues for all regions, in numbers and traffic lights. It also investigated convergence and divergence between the analytical teams and found that for longer-known issues, such as sulphur dioxide emissions, all models agreed. For issues where modelling was relatively new, such as land-use change, larger differences appeared (Potting and Bakkes, 2004).

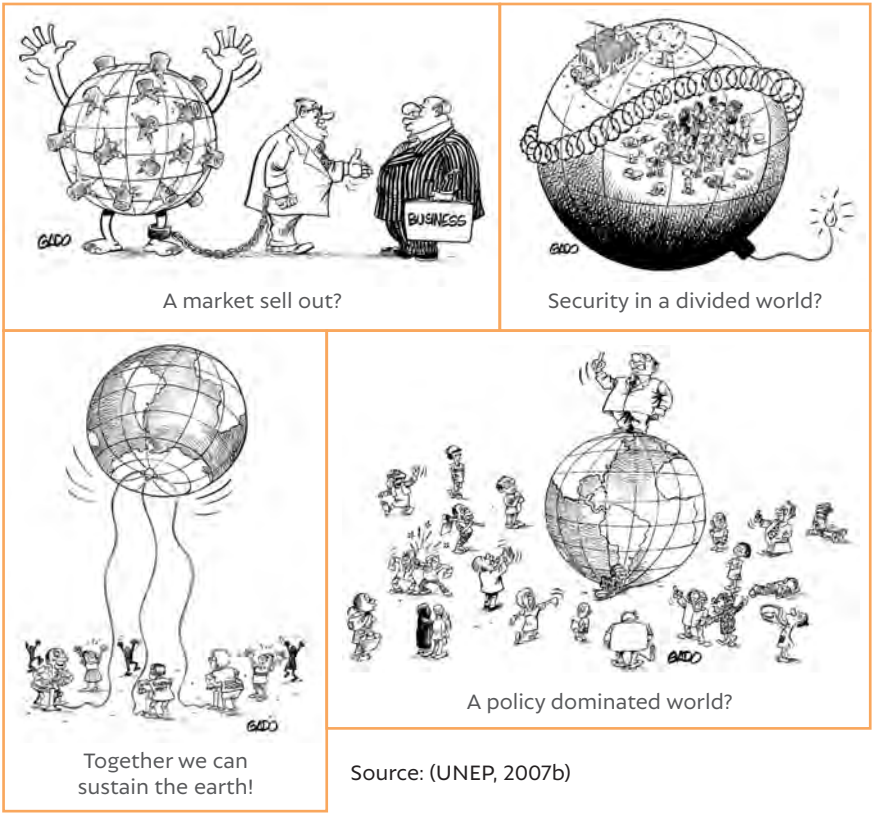
GEO-3 saw the first full-blown development of regional scenarios, in all four variants that were elaborated at the global level, in terms of "Environmental Implications" that the four scenarios would have for each of UNEP's six regions plus the Polar zones. Indeed, the four global scenarios have a significant regional flavour to them, with a complete and deliberate interweaving of multiple examples from UNEP's six regions under all four and many references made therein to potential developments in these six regions. This made these four scenarios fresh and compelling but required close working relationships between the global and regional contributors. This contrasted with most other GEO outlook chapters where the global and regional analyses were developed and presented separately, making linkages less evident.

Interestingly, different views were expressed on which of the scenarios felt the most like current reality. In the European and North American scenario workshops, the steady economic progress of *Markets First* was often mentioned as closest to reality at the time *GEO-3* was being produced (early 2000s). But participants from Africa often recognized the hostile atmosphere of *Security First* (earlier known as *Fortress World*) as being closer to their current reality (Raskin and Kemp-Benedict, 2004).

In *GEO-4*'s outlook Chapter 9 "The Future Today," the same four scenarios are presented as in *GEO-3*, this time up until 2050 rather than 2032, again using a mix of narrative storylines and quantitative data, "...to explore different policy approaches and societal choices at global and regional levels" (UNEP, 2007b, p. 398). After the main messages, the chapter began by

laying out fundamental assumptions behind the four scenarios in a table of key questions. Cartoons are used as a communications tool, with the four scenarios then being detailed in two-page snapshots, making it easy for readers to grasp the different potential futures envisioned under each.

Figure 5.2.1. Cartoons by Gado illustrating the *GEO-4* scenarios
A view of the future?



Source: (UNEP, 2007b)

The bulk of the chapter, however, is devoted to demonstrating the implications of the four scenarios on various environmental themes – atmosphere, biodiversity, land, water, as well as human well-being and vulnerability and implications for the Millennium Development Goals (MDGs) – with numerous quantitative graphs at both global and regional levels to illustrate likely paths of future development (UNEP, 2007b, pp. 428–431).

Once again, in *GEO-4*, the narratives and numerical elements complement each other, with several contemporary scenario exercises referenced. The *GEO-4* outlook is arguably the most quantitative of all global GEO outlooks,

at least in appearance, with dozens of trend graphs and maps showing the probable evolution of various indicators from 2000 to 2050 by region and globally. With these, *GEO-4* includes in the main report what had only been extra material in support of *GEO-3* (Potting and Bakkes, 2004).

The outlook in *GEO-5* is titled "Scenarios and Sustainability Transformation" (UNEP, 2012a, pp. 419–456). Rather than re-working all four scenarios used in previous GEOs, it concentrates on two very different storylines until 2050, the two highly contrasting *Conventional World* and *Sustainable World* pathways. This outlook explores the deep-seated changes in human behaviour and mentality that would be required to move the planet as a whole onto a truly sustainable future path, including in the key realms of production and consumption. This is done by contrasting the two scenarios through the lenses of major environmental themes, which are limited this time to atmosphere, land, water and biodiversity. It also provides an analysis of the gaps between the two scenarios and what measures could help to close those gaps, as well as a detailed look at various means of reversing the unsustainable through improved governance and gradual changes in societal attitudes and behaviour.

To achieve a sustainability transformation, the *GEO-5* outlook offers a vision with goals and targets that would need to be met by 2050. It describes the main challenge as "(being able to meet) both human needs and human aspirations within the planet's carrying capacity" (UNEP, 2012a, p. 423). The goals and targets are mostly derived from existing multilateral environmental agreements, many of which have been poorly or at best partially implemented until now.

The resulting outlook chapter in *GEO-5* "Scenarios and Sustainability Transformation", diverges in a major way from the previous GEO reports. While not a true backcasting exercise[3], the chapter focuses on several targets as end points and how they could be achieved, mostly in global terms. In great contrast to *GEOs-3* and *4*, the scenario analysis of *GEO-5* focuses almost exclusively on the global level, with little mention of the regions other than a few examples. In this, the outlook part complements the rest of *GEO-5*, with its extensive coverage of regional detail in environmental trends and policy

[3] Different from forecasting, backcasting is a scenario approach that explores the feasibility of a desirable future; for example, by analyzing the critical path. The central element is a vision of the desirable future. While forecasting seeks answers to questions starting with *what if...*, backcasting tries to answer *how to ....*? In terms of support to policy, backcasting is meant to connect a vision for the future to present-day decision-making. Backcasting can be a powerful tool in interacting with stakeholders, to connect a vision for the future with concrete near-term priorities (van Bers et al., 2016).

options. Ultimately, the concept of moving towards a sustainability transformation distinguishes the outlook chapter of *GEO-5* from all previous treatments of this aspect.

GEO-6 devotes almost one-fifth of its 700 pages to an outlook, namely six chapters in Part C entitled "Outlooks and Pathways to a Healthy Planet with Healthy People" (UNEP, 2019e, pp. 463–592). The chapters explore pathways for sustainable development, reaching the SDGs by 2030 and continuing to 2050 and beyond on a sustainable, long-term trajectory. The outlook investigates the scale of the challenge as well as synergies and trade-offs between the goals. This line of inquiry is a logical continuation from *GEO-5*. The whole section reflects the broad change from *what-if* scenarios, as considered in the early GEOs, to *how-do-we-get-there* by maintaining a vision of worldwide sustainable development.

The future study of the *GEO-6* outlook features the usual creative mix of narratives and quantitative projections. Three additional elements are striking. First, an extensive introduction has to navigate the full n-dimensional 'thought space' of GEO and the SDGs, plus obligatory concepts such as 'transformative change.' The introduction serves to position the exercise in terms of regions, themes, time horizons, top-down/bottom-up balance, and even sustainability ideology.

Second, the exercise derives its authority not so much from the substantial work by its analytical team but by positioning itself as part of a growing movement of environment-related future studies and acknowledging an array of approaches within this movement. It enabled the GEO team to annotate its conclusions in terms of robustness, using judgments such as 'well-established' or 'well-established but incomplete.' This is similar to a style adopted by the Intergovernmental Panel for Climate Change a few years earlier. In this vein, the outlook part is one of the rare occasions in *GEO-6* where insights from the six *GEO-6* regional reports of 2016 are acknowledged, albeit briefly (UNEP, 2019e table 21.1).

Third, the *GEO-6* outlook draws conclusions not only in terms of challenges, such as economic sectors, rates of technological progress or distributive justice[4] but also in terms of synergies and trade-offs between SDGs, viewed in a long-term perspective. It builds on its conclusions by naming three key areas of intervention with significant synergies across the targets: changing

[4] Distributive justice in relation to environment and development concerns the fairness of the distribution of pluses and minuses of environment practices and related interventions, especially across different segments of the population, for example in terms of age groups, ethnic groups and prosperity classes.

the human diet, improving education and combating air pollution. This latter statement, on key areas of synergy, is one example of author-drafted chapter conclusions in recent GEOs that makes them more thought-provoking than the government-approved Summary for Policy Makers.

Table 5.2.1. GEO forward-looking analyses

	Main scenario set-up	Regional detail of analysis	Focus	Time-horizon	Chapter length pages	Further details
GEO-1	Business-as-usual + technology variants	6 regions	What is likely to happen if current human behaviours go unchanged? For example, trends in consumption as the middle class grows in many regions, human diet, technology and resource use, trade.	2050	42	Bakkes and van Woerden (1997)
GEO-2000	Regional baselines and policy variants. Global backdrop added later	6 regions	What can be achieved with moderate, region-specific policies? For example, water-efficient agriculture, ambitious water recycling, and desalinization	Diverse. Added backdrop is to 2050	28	van Vuuren and Bakkes (1999); UNEP (1999b, 1999c, 1999d, 1999e, 1999f)
GEO-3	Four richly described scenarios of contrasting development. Policies embedded, not separate	6 regions, each with subdivision, plus a global total. Systematic overview in tech report	What is the future we want as a society? *Markets First, Policy First, Security First* or *Sustainability First?*	2032	82	Raskin and Kemp-Benedict (2004); Bakkes et al. (2000a, 2000b); Potting and Bakkes (2004).

GEO-4	Same as *GEO-3*	6 regions, for every scenario and every theme, plus global. Systematic overview included in report body; limited analysis of polar regions.	Interlinkages between environment themes and between environment and development issues. Rates of change required versus historical evidence. Key messages are planet-level.	2050	60	
GEO-5	*Conventional World* and *Sustainable World*	None	Visions, goals and targets on the road to 2050	2050	38	
GEO-6	Future developments without targeted policies. Drawing on Shared Socioeconomic Pathways to Sustainable Development		How can we achieve the environmental dimension of the SDGs and related multilateral agreements? What mid- to long-term strategies are needed to achieve lasting sustainability?	2050 mostly. 2100 for some themes	132	O'Neill et al. (2017)

Concluding Observations

Table 5.2.1 summarizes the evolution of the GEO outlook component from *GEO-1* through *GEO-6*. The middle two GEOs to date, and particularly *GEO-3*, took up the most intellectual space by connecting to broad, powerful and intuitively significant patterns of development. Building on a decade of early work, including *GEO-1* and *GEO-2000*, *GEO-3* contributed greatly to connecting environmental care and human development in the public mind, both globally and for specific regions. This seems to have coincided with a transitional phase of maturity in the GEO scenarios' development process in terms of ambition, participants and paid and in-kind resources for the work.

In step with the whole of GEO, the outlooks of *GEO-5* and in particular *GEO-6* included the established *what-if* type scenarios in a broader, goal-driven analysis of pathways to sustainable development. The *GEO-6* outlook added to the existing framework of the SDGs by considering them against a farther time horizon (2050) and by focusing on synergies and trade-offs between individual targets.

One issue that seems to have resolved itself is the early difficulties, or even distrust, between traditions of scenarios as storytelling and model-based quantification. During the first decade of GEO, while its centre of gravity was still in its network of collaborating centres, this issue gradually dissolved through joint learning-by-doing GEO-style. At the same time, the harsh reputation of normative models, in the style of the International Monetary Fund, wore off. Today, GEO benefits from the strengths of both traditions: the imagination and mobilizing power of storytelling and the evidence of quantification.

GEO-6, in particular, made a point of building on existing work from earlier GEOs and studies by other organizations. It sought to explicitly position the GEO outlook work as a member of a diverse family of forward-looking analyses, taking advantage of multiple lines of work, not just one school. Specifically, it recognized inputs to *GEO-6* outlook work based on: top-down as well as bottom-up approaches; an increasing body of 'target-seeking' scenarios in the context of the SDGs; engagement of stakeholders in knowledge production; and communication with decision makers throughout the process, not just at the end (UNEP, 2019e, sec. 19.3).

Throughout the series, outlooks have made the GEO process and products stronger by helping to make connections. Of these, the most important are:

- The connection between the present and challenges and opportunities on the horizon, thus offering policymakers fresh vocabulary in making commitments for the future. As mentioned earlier in this section, many changes that will occur in the future have already been set in motion today. The case for putting the results of scenarios in the hands and minds of decision makers is cogently made in the introduction of *GEO-3*'s "Outlook" Chapter 4, which explained how consideration of a number of possible futures could help today's decision makers understand what these futures could hold for the planet in environmental and societal terms, and thus make decisions that could lead to a more desirable future (UNEP, 2002e, p. 320).
- Acknowledging that contrasting perceptions of what is going on in the world may be equally valid, for example, perceptions on globalization,

use of natural resources, and regional conflicts. In particular, the colourful contrasting storylines of *GEO-3* scenarios allowed many participants to connect their regional realities with global environmental policymaking. Most strikingly, in the early 2000s, contributors in Africa typically identified Security First as their reality on the ground, in contrast to comments from the other regions. Responses from the regions in the early 2020s may well be different.

- Added significance for retrospective information, such as classic state of the environment and descriptive accounts of development in environment policy. As mentioned above, the outlook work of GEO showed that in various regions of the world, existing environmental issues can change in their nature once a threshold is passed and start interacting with or producing new problems. In this and other ways, GEO outlooks helped illuminate where current trends could lead to in the absence of timely intervention. The connection between outlooks and retrospective information works the other way around as well: long-term series of past developments are evidence that changes as significant as those projected in some scenarios (deforestation, collapse of fisheries, air pollution clean-up) have happened in the past and therefore cannot be dismissed as fairy tales that are unlikely to come true.

Through such connections, the outlook element considerably strengthened GEO's saliency and relevance in terms of both its findings and its process. It also took UNEP's role to provide early warning of emerging environmental problems and threats to a new level, expressly in an environment and development context. This ground-breaking element made GEO the true global environment outlook that it is while increasing the number of contributors involved and greatly widening its appeal with readers.

5.3 Other main elements found in GEOs 1-6

Introduction

While the main components (Driving forces and Pressures, State of and trends in the environment, Impacts including human well-being and policy Responses to threats and change) are regular threads throughout the global GEOs, they do not occupy centre-stage alone in the reports. Indeed, other elements such as policy options/recommendations, environmental data concerns and the integrated Earth system are topics of occasional analysis in what became an increasingly innovative GEO series over the

years. The following section identifies and describes these other key elements and what roles they played, beginning with *GEO-1* published in 1997.

The Issue of Environmental Data for Integrated Environmental Assessments

The issue of data has always presented a challenge to the GEO process and is one of the reasons that a Data Working Group has advised each report (Chapters 7.3 and 7.5). It is also why it has been flagged as an issue in every global GEO to date, although in greater detail in some than others. *GEO-2000* was the first edition to undertake a brief exploration of the data issue. In little over three pages of its preambular material (UNEP, 1999g, pp. xvi–xix), *GEO-2000* explains the critical role of environmental and other data for conducting science-based environmental assessments. Analysed issues include data quality, data availability, geo-referenced data and space-based observations, along with access to data. A chart also identifies both institutional and technical constraints affecting data issues (UNEP, 1999g, p. xviii).

It was not until *GEO-5*, however, that the data question was explored again in any detail. In this case, it appeared as Chapter 8, "Review of Data Needs," at the end of Part 1, "State and Trends of the Environment." This 16-page chapter is perhaps the only one ever written by the UNEP Secretariat itself and aims to provide "...a snapshot of the data on which *GEO-5* [was] based" (UNEP, 2012a, p. 217), as well as highlighting data limitations and gaps on a thematic basis, such as air, land, water. It also describes international programmes supporting global data collection and official environmental statistics from countries, noting problems of both quality and quantity in the latter.

It is perhaps in *GEO-6* that the broad data issue is taken the most seriously, with two full chapters directly on this subject. The first of these, Chapter 3, is entitled "The Current State of our Data and Knowledge." It includes a history of environmental statistics, the need for improved data and derived indicators for monitoring progress toward the SDGs, major data gaps for *GEO-6,* including gender-related data and existing data systems. The second is *GEO-6*'s final Chapter 25, "Future Data and Knowledge Needs", in the closing Part D of the entire volume. Many issues such as citizen science-generated data, big data and data analytics, and traditional data are dealt with in several cases through case studies, notably one on the Global Learning and Observations to Benefit the Environment programme for citizen science (GLOBE, 2020). Near-future trends and

means of data collection, and the challenges of working with these new data streams, are also examined.

Thus, not only do these *GEO-6* chapters finally give the data problem what it is fully due in the integrated environmental assessment context, but they break new ground exploring various cutting-edge aspects of environmental data and statistics in terms of their implications for GEO-style reporting.

Finally, in terms of the presentation of data in GEO reports, one should not overlook the novel presentation of pairs of Landsat satellite images included in the *GEO-3* report at the end of the nine thematic sections of Chapter 2. These pairs of images from roughly 20 years apart – including the shrinking Aral Sea, the "Black Triangle" of Central Europe, the Mesopotamian Marshlands – are accompanied by brief explanations of the phenomena involved, leading to the often dramatic and undeniable changes that can be observed.

Environment and (or for) Development as a Theme

While the entire GEO series can be said to be about the environment from a development perspective, the first two GEOs made only limited use of sustainable development terminology. For example, *GEO-2000* briefly discusses development on pages 15 and 16, stating that "The environment cannot be separated from the human condition, but it is one essential complement of sustainable human development" (UNEP, 1999g, Chapter 1 p. 20). It also has a table on policy goals for achieving sustainable development at the end of the global synthesis section (UNEP, 1999g, Chapter 3 p. 215), but there is very little discussion around the concept of sustainable development in the text. Nevertheless, the first two GEOs were essential in preparing the ground for the SDGs of the 2010s: by framing environment issues in a development context, in increasingly rich detail and narratives as well as numbers; by recognizing global as well as regional perspectives; and last but not least, by its process of engaging regional expertise through its collaborating centres.

GEO-3's Chapter 1, "Integrating Environment and Development: 1972–2002," traces the development of international governance measures and institutions, along with significant events related to the environment up until the end of the 20th century, in a nearly 30-page chapter. Using a decade-by-decade approach, this unique chapter shows how general environmental concerns evolved from one to the next and how global society reacted

to increasingly obvious environmental issues and threats. According to this timeline, the 1970s saw the foundation of modern environmentalism, the 1980s led to the definition of sustainable development, and the 1990s became the decade of implementing this concept, marked by the United Nations Conference on Environment and Development (or Earth Summit) and *Agenda 21* in 1992 (UNCED, 1992). This chapter ends with a look forward at the environmental agenda for the 2000s, including highlighting numerous emerging issues – climate and energy, and globalization, among others – but curiously, there is no mention of the MDGs that were the main outcome of the year 2000 Millennium Summit (UNGA, 2000).

Along a similar line, *GEO-4*'s Chapter 1 takes a slightly different tack on this theme by rendering the subject as "Environment for Development," thus endorsing and promulgating the sustainable development paradigm. While significant parts of this *GEO-4* chapter are covered in sections 4.3 (Driving forces) and 4.5 (Human Well-being) of this book, there are other parts of "Environment for Development" that bear exploring.

This Chapter drives home the points that the natural environment is the basis of human lives and livelihoods and that economic development cannot be sustainable unless it considers the natural environment. It reviews major steps in international environmental governance that linked the environmental, economic and social spheres, in particular the work of the World Commission on Environment and Development and its report *Our Common Future* (United Nations, 1987), along with *Agenda 21* that stemmed from the 1992 Earth Summit in Rio de Janeiro, Brazil.

This Chapter also describes MDG 7 on environmental sustainability and linkages between the environment and other MDGs. Thus overall, Chapter 1 of *GEO-4* sets the scene for a discussion of progress and setbacks within the various environmental compartments, much in the same way as the first chapter of *GEO-3* had done, but with greater emphasis on key interlinkages.

Section 4.5 has already covered *GEO-4*'s Chapter 7 on "Vulnerability of People and Environment: Challenges and Opportunities," which devoted 60 pages to analysing challenges and opportunities to reduce vulnerability and increase human well-being while protecting the environment. This comprehensive chapter explores multiple dimensions of environment-related vulnerability and human well-being. It remains, without a doubt, the most detailed treatment of this very broad subject in the entire GEO series of reports.[5]

[5] Notwithstanding that *GEO-3* included a briefer chapter entitled "Human Vulnerability to Environmental Change" (UNEP, 2002e, pp. 301–317).

The SDGs that appeared as part of the international environmental agenda in the mid-2010s soon found their echoes in the global GEO series. *GEO-5*, published in 2012, pre-dates the formal negotiations for and eventual launching of the SDGs in August 2015. However, *GEO-5* does show awareness of the nascent thought process of the SDGs, referring to its ambition level and time horizon, in particular in concluding Chapter 17, "Global Responses." This occurs first in a very focused explanation of its conceptual framework (UNEP, 2012a, pp. xix–xxi), then by theme-specific assessments of progress towards goals in each chapter of the "State and Trends of the Environment" part, and finally through examples of promising policy tools in their national context. In addition, the necessary global ambition level is underlined by both the United Nations' Secretary General and UNEP's Executive Director in *GEO-5*'s "Foreword" and "Preface".

GEO-6, in contrast, is squarely positioned as a road map to achieving the United Nations' Agenda 2030 (UNEP, 2019e). The SDGs explicitly appear in *GEO-6* in three ways:

- in explaining the purpose and legitimacy of *GEO-6* in both of the forewords and the introductory chapter;
- in measuring progress made and ambition needed by discussing indicators and as a reference in many graphs in, for example, the "Freshwater" chapter; and
- as a basis to synthesize policy messages: in terms of pathways, synergies or trade-offs between separate policies and perspectives to 2030 and 2050 in the outlook part, and the preambular material from the *GEO-6* co-chairs.

Thus, from *GEO-3* onwards, the interlinkages between environment and development and international environmental goals (MDGs, SDGs) have been heavily featured in all GEOs.

GEO and UNEP's Early Warning Role

GEO has arguably contributed much to UNEP's role of early warning of emerging issues. In fulfilling its overall mandate of keeping the world's environment under review, UNEP pays special attention to early warning of emerging issues of environmental concern.[6] This is nominally distinct from

[6] UNEP's mandate on early warning was encapsulated in the original United Nations General Assembly decision 2997 (XXVII) of 15 December 1972 (UNGA, 1972). Section I/2 reads "Decides that the Governing Council shall have the following main functions and responsibilities ... (d) To keep under review the world environmental situation in

producing UNEP's environment outlooks (GEO) but sufficiently related to benefit from shared insights and organizational proximity.

GEO's contribution to early warning of emerging issues has occurred in various ways, one of these being through the GEO process as a whole, in the global and other reports. A second way was through the parts of GEO reports that explicitly look to the future: scenario studies and, occasionally, special surveys or sections. Examples of the latter are in *GEO-2000* (UNEP, 1999g, pp. 339 and 363) and *GEO-5* (UNEP, 2012a, pp. 56 and 183). And finally, a third way has been through the extensive theme-specific information in GEO's state and trends parts. Examples of this are found in *GEO-1* on the prospect of megacities of over 100 million inhabitants (UNEP, 1997c, p. 23) and in *GEO-6* on the opening of the Arctic (UNEP, 2019e, p. 41). Each of these pathways contributed to identifying and raising awareness of emerging issues.

From 2003 to 2014, UNEP's main publication drawing attention to emerging issues was the *GEO/UNEP Year Book* series (UNEP, 2020g), now replaced by the periodic *Frontiers* repors. Each report highlights a limited number of emerging issues, for example, the environmental dimension of antimicrobial resistance or environmental displacement (UNEP, 2017a).

The Earth System Perspective and Interlinkages

Another significant theme is interlinkages between different planetary systems (human and natural) and the broad Earth system as a whole. This recurrent element features in global GEO editions from the start: for example, in the global "Introduction to Regional Perspectives" in *GEO-1* and the 20-page "Global Perspectives" chapter opening *GEO-2000*. Later, interlinkages and planetary systems reappear as more explicit themes, reflecting evolving concerns in policy and science: *GEO-4*'s Chapter 8, "Interlinkages: Governance for Sustainability," *GEO-5*'s Chapter 7, "An Earth System Perspective", and *GEO-6*'s Chapter 4, "Cross-cutting Issues", and Chapter 17, "Systemic Policy Approaches for Cross-cutting Issues".

The *GEO-4* "Interlinkages: Governance for Sustainability" chapter (34 pages) "...pursues the current understanding of human-environment interlinkages." It examines how "...drivers, human activities and environmental changes are interlinked through complex cause-and-effect relationships embedded in both biophysical and social processes" (UNEP, 2007b, p. 365).

order to ensure that emerging environmental problems of wide international significance receive appropriate and adequate consideration by governments."

It also looks at how environmental governance regimes at various levels could be better aligned through what is referred to as adaptive governance measures.

Five years later, *GEO-5*'s Chapter 7, "An Earth System Perspective" (20 pages), looked at changes in the interconnected Earth system of which humans are an integral part. This Chapter discusses some of the unprecedented changes that are taking place within the Earth system, stating "Evidence shows that human activities are now so pervasive and profound in their consequences that they affect the Earth at a planetary scale" (UNEP, 2012a, p. 195).

Most of the Chapter is devoted to discussing these system changes and their implications for human well-being. But the Chapter also covers the concepts of overshoot, crossing of thresholds, and tipping points in terms of Earth systems. In its concluding pages, it describes how transition management needs "...to improve understanding of the dynamics of complex processes of change and try to influence their pace and direction" (UNEP, 2012a, p. 209).

Finally, in regard to interlinkages among Earth systems, *GEO-6* includes the two chapters 4 and 17 mentioned above. Chapter 4, "Cross-cutting Issues," examines 12 such issues grouped under three subheadings[7] and how each of these issues provides an entry point and relates to Earth system topics. The stated purpose is to "demonstrate where intersections and nexus issues will need synergistic solutions with the objective of achieving true transformative change" (UNEP, 2019e, p. 97).

Chapter 17, "Systemic Policy Approaches for Cross-cutting Issues," analyses four of the 12 cross-cutting issues named in Chapter 4 – climate change, the food system, energy and resource use – due to their link to important economic, social and environmental systems (UNEP, 2019e, p. 428). The intent is to identify and evaluate policies that can help achieve systemic transformation in these four sustainable development challenges: resilience to climate change, creating a sustainable food system, decarbonizing energy systems and moving the world towards a more circular economy. The Chapter concludes that such "...systems policy approaches with transformative potential do exist. If key leverage points can be identified in a system and the right policy interventions are made...transformative change leading to innovations will lead to net positive effects" (UNEP, 2019e, p. 446).

[7] People and livelihoods (health, environmental disasters, gender, education, urbanization); Changing environments (climate change, polar regions and mountains, chemicals, waste and wastewater); and Resources and materials (resource use, energy, food systems).

Options for Action

The concluding parts of the global GEO report series have varied greatly through time. For example, in *GEO-1*, the final Chapter 4, "Looking to the Future,"[8] was actually GEO's first attempt to use integrated modelling techniques and scenarios as tools for policy setting and planning (UNEP, 1997c, p. 215). Essentially, this is what in subsequent global GEO reports grew into the outlook component, although that never featured again as the report's concluding chapter. In this sense, *GEO-1* seems to end rather abruptly, with no overall conclusions, but still foreshadowing much for the future. Overall conclusions flowing from the report as a whole had been formulated and, after high-level discussions in UNEP, were moved up front as *GEO-1*'s "Executive Summary" (UNEP, 1997c, pp. 1–12).

GEO-2000 presents a different case, with the final Chapter 5 entitled "Outlook and Recommendations." This, in fact, was not the outlook proper, which is instead found in the previous Chapter 4 called "Future Perspectives." But Chapter 5 is unique in laying out a series of "Recommendations for Action" after briefly reminding about current unsustainable trends and new problems. These may have only been common-sense suggestions but did respect that governments had recommended the inclusion of "recommended measures and actions" when requesting the first two GEOs (Annex I). However, it turned out that, as the main consumers of the reports, governments did not want to be told what they should do, and so subsequent global GEOs instead offered options for action. This political consideration aside, the recommendations for action in *GEO-2000* can be seen as the forerunner of future GEOs' policy options.

The cases of *GEO-3* and *GEO-4* confirmed the trend of presenting an assortment of broad policy options for governments to consider. However, in the case of *GEO-3*'s Chapter 5, "Options for Action", this was done in a far more succinct fashion (10 pages) than in *GEO-4*'s Chapter 10, which is almost four times as long. In the *GEO-3* chapter, a series of boxes offered "Suggestions for Action," mostly under various policy headings such as "Valuing the environment" and "Making the market work for sustainable development" (UNEP, 2002e, pp. 405–408).

GEO-4's Chapter 10, "From the Periphery to the Core of Decision Making - Options for Action," offers a sophisticated discussion of both existing and newer policy instruments and the relevance of their application in tackling long-standing as well as emerging environmental problems. The entire set

[8] See section 5.2 above on this outlook-related chapter.

of problems is mapped along a continuum in terms of management and possible reversibility to frame the discussion.

Numerous approaches for raising the profile of the environmental agenda are described (UNEP, 2007b, pp. 462–464), and critical gaps and implementation challenges for environmental policymaking are documented (UNEP, 2007b, pp. 464–468), including a chart providing an overview of global policy targets for major environmental problems (UNEP, 2007b, fig. 10.3). A two-track strategic approach towards a future policy framework is elaborated (UNEP, 2007b, pp. 468–479) to expand the reach of proven policies and find new transformative policies. A final section explores the conditions for successful implementation of the proposed new policy framework (UNEP, 2007b, pp. 479–493), including such issues as public awareness, monitoring and evaluation, organizational reform and financing the environmental agenda.

GEO-5's final Part 3 consists of two major chapters. The first is Chapter 16, "Scenarios and Sustainability Transformation," (38 pages), with the latter part bringing a unique approach to the GEO series. Although the need for a major transition in human behaviour was already mentioned in previous volumes, *GEO-5* elevates this concept to full prominence and explores the various aspects of such a transition, from the setting of sustainability targets through transforming production and consumption patterns to fundamental shifts in underlying human motivations and value patterns.

This part of Chapter 16 describes how to advance sustainability through various paths at the subglobal level by applying four strategic elements: compelling visions and social contracts, reversing the unsustainable, leverage points, and adaptive management and governance. Such a transformation needs to be "...without precedent in human history..." and one that would "...effectively transform society's material metabolism..." (UNEP, 2012a, p. 444).

The "Global Responses" Chapter 17 (UNEP, 2012a, pp. 457–486) seeks to take stock of current global responses to environmental issues and then to look at emerging options and policy clusters based on conclusions largely derived from Part 2's "Policy Options". The first of these two sections "...assesses the state of global responses to date and highlights gaps and barriers that have hindered the collective ability to manage environmental change" (UNEP, 2012a, p. 461). The second section of Chapter 17 offers a list of six broad global response options as part of a systemic approach to more sustainable development and towards deeper societal transformation (UNEP, 2012a, pp. 459 and 470–483).

GEO-6's penultimate Chapter 24 is entitled "The Way Forward" and appears as the last chapter of Part C, "Outlooks and Pathways to a Healthy Planet with Healthy People," whose goal-driven scenarios have been more fully analysed in Section 5.2 above. Chapter 24 reprises many of the earlier conclusions found throughout *GEO-6*, at the end of individual chapters, including the call for transformative change and the basic concept of *GEO-6* that a "...healthy planet is the ultimate foundation for supporting all life forms, including the health and well-being of humans..." (UNEP, 2019e, p. 587). With this global GEO reaching a total length of slightly over 700 pages, these chapter summaries and overall conclusions are worth recognizing as an important element on their own.

Summary

This section demonstrates that aside from the many core elements included as standard chapters and analyses in *GEOs 1-6*, there has also been a certain dynamism and willingness to experiment with the proven formula. Occasionally this represented a response to UNEP's governing body; for example, in *GEO-5* to analyse the indicative costs and benefits of policy options. At other times, it was inspired by thinking within the GEO Secretariat and the extended GEO family. The ability to adapt, adjust and innovate in terms of the contents of the subsequent reports has helped to make the volumes relevant to an ever-expanding audience while allowing UNEP to justifiably claim that the series regularly had something new to offer.

5.4 Regional aspects, content and treatment in global GEOs

Introduction

One of the major differences found in the global series of *GEO 1-6* is the relative balance of explicitly global versus regional analyses. This is particularly manifest in the state and trends portions of the six reports, and to a lesser extent, in the policy options and outlook chapters. Interestingly, *GEOs-1* and *-2000* undertook a more regionally based approach than *GEOs 3-5*, which begin with explicitly global chapters covering the main themes – air, biodiversity, land and water – followed by some level of regional analyses. In contrast, *GEOs-1* and *-2000* cover seven regions[9] in greater detail

[9] Africa, Asia and the Pacific, Europe and countries belonging to the Commonwealth of the Independent States, Latin America and the Caribbean, North America, West

and length and include a global overview that is a synopsis of the main regional issues. This more bottom-up approach was discarded after *GEO-2000* but reappeared with *GEO-6*, which first published six complete individual regional assessments in 2016, while the global *GEO-6* was published only in 2019. With these six separate regional reports – ostensibly meant to inform and feed into the global *GEO-6* – one can argue that the handling of regional aspects came full circle since *GEO-1* appeared in 1997.

While, to some extent, the global versus regional structuring and content of the six global GEO reports offered different looks and presentations of the material from one GEO to the next, there are real differences in the global-regional balance and the content order among the six global reports. The following section documents the regional content of the six global GEO reports to date and examines some of the potential reasons for the changing global-regional balance. This section does not cover subglobal GEO reports, which are examined in Chapter 6.

UNEP's Regional Structure and Breakdown

As one body of the United Nations Secretariat, UNEP operates on a regional basis, but in doing so, it does not precisely follow the breakdown of countries by region and subregion established by the United Nations Secretariat in New York.[10] UNEP works in six political regions (footnote 9), while the Polar Regions are included for geographic purposes. UNEP maintains regional offices in all six political regions, including at UNEP Headquarters in Nairobi for Africa. In addition, UNEP runs liaison or similar offices in some countries, including Brazil, China and the Russian Federation.

For UNEP, each of the six political regions,[11] other than North America, is made up of two or more subregions, and the countries considered to be

Asia and the Polar Regions. *GEOs-3* and *4* also covered seven regions, but the "Polar Regions" (as a separate, seventh region) were dropped with *GEO-5*.

[10] An official list of countries by region as used by the United Nations Secretariat (United Nations, 2020).

[11] Authors' note on geographic terminology: UNEP uses the term "regional" for GEO reports that cover one of its six regions. Thus, "subregional" reports are those that cover either an explicit UNEP political subregion, or some subset of countries within a UNEP region, or a natural one such as the entire Amazon River Basin. National GEO reports cover a single country, and subnational reports part of a given country, while local reports (GEO-Cities) cover a city or municipal zone. This is to make clear that while in a more general sense, geographic areas within a UNEP 'region' or 'subregion' or within a country can also be called a region, for the purposes of GEO and throughout this book, a "region" or a "regional" report is only applied to what UNEP considers to be one.

part of each of these (sub)regions are fairly fixed lists. However, there have been some variations over the years, as in the shift of Central Asia from Europe to Asia and the Pacific in *GEOs-3* to *5*, and back again for *GEO-6*. An official list of countries by region, with a breakdown by subregions as designated by UNEP, can be found in the UNEP's Environmental Data Explorer website (UNEP, 2020h).

Regional Aspects, Content and Treatment in GEOs-1 to 6

It is important to recall that the first GEO employed a mostly regionally-based approach throughout. In a roughly 260-page report, *GEO-1's* Chapter 2, "Regional Perspectives" (110 pages) deals with environmental state and trends in the seven regions in considerable detail while including a brief global overview that summarizes the main regional issues. In Chapter 3, "Policy Responses and Directions" (85 pages), the seven regions were again the basis for describing existing policies related to the seven environmental themes.[12]

Thus, in *GEO-1*, the regional state and trends and policy response chapters alone make up a full 75 per cent of the volume. Even the bulk of Chapter 4, "Looking to the Future," takes a mostly regionally based approach in analysing likely trends in climate change, land use, human health and pressure on natural habitats, as did much of the "Executive Summary". As a result, *GEO-1* is the most explicitly regionally based of all six global GEO reports. However, in the case of *GEO-6,* as mentioned earlier, six stand-alone regional reports preceded the global one, thus alleviating the need for much regional content.

The structure of the *GEO-2000* report is quite similar to that of *GEO-1*, with a Chapter 1 on "Global Perspectives" and a Chapter 2 on "The State of the Environment." The latter begins with a "Global and Regional Synthesis," opening with a 30-page overview of the various themes, such as stratospheric ozone depletion and natural disasters, and showing regional trends within each theme or regions within themes. But then the chapter continues with 125 pages of analyses of the environmental situation in each of the seven regions treated in *GEO-1*, or themes within regions. Chapter 3 looks at "Policy Responses" under the same geographic headings as Chapter 2, followed by a "Future Perspectives" Chapter 4 and a new

[12] Atmosphere, biodiversity, land, water, forests (typically included in land in other GEOs), marine and coastal environments (typically included under water in others), and urban and industrial environments (typically included under land in others).

"Outlook and Recommendations" Chapter 5. In terms of geographic treatment, the seven regions analysed are the same as those in *GEO-1*.[13]

The *GEO-2000* "Future Perspectives" chapter begins with global sections on "Issues" and "Pointers for the 21st Century", but the following two-thirds of this chapter are devoted to "Alternative Policy Studies" for all regions except the Polar. However, each region only looked at one particular area of future concern and conducted an alternative policy study about that issue in relation to a global backdrop scenario. This chapter can be seen as a prototype for *GEO-3*'s Chapter 4, "Outlook: 2002–2032". The brief Chapter 5, "Outlook and Recommendations," in *GEO-2000* does not deal with the regions at all, offering a preview of the 21st century at the global level only.

Nevertheless, with lengthy individual sections for all seven regions under both "The State of the Environment" and "Policy Responses" chapters, as well as having two-thirds regional treatment in the "Future Perspectives" chapter, the balance of *GEO-2000* remains well on the regional side. Interestingly, it was between the publications of *GEO-1* and *GEO-3* that the first prominent and separately prepared regional reports began to appear: three GEOs for Small Island Developing States in 1999, the first *GEO for Latin America and the Caribbean* in 2000 (UNEP, 2000b), the *Asia-Pacific Environment Outlook-2* in 2001 (UNEP, 2001a) and the first *Africa Environment Outlook* in 2002 (UNEP, 2002a). The implications of this increased regional-level GEO reporting are analysed at the end of this section.

The *GEO-3* report, published in May 2002, is the first GEO in which the global content began to assume equal or greater prominence to regional analyses. However, the regional analyses are still fully present in two of the four major chapters and partially in a fifth minor one.

Environmental state and trends are covered in the massive Chapter 2 entitled "State of the Environment and Policy Retrospective 1972–2002" in over 270 pages. For seven regions and the eight environmental themes[14] now covered, *GEO-3* provides a retrospective analysis of regional environmental trends from 1972, the year UNEP was established, to 2002. This

[13] However, what was formerly labeled as "Europe and the Commonwealth of Independent States" was now "Europe and Central Asia." In *GEOs 3-5*, the subregion of Central Asia was considered part of the Asia and the Pacific region; only in *GEO-6* did Central Asia once again revert to the pan-European region (these changes were aligned to UNEP's official regional breakdown, which has varied).

[14] Land, Forests, Biodiversity, Freshwater, Coastal and marine areas, Atmosphere, Urban areas, and Disasters.

would be the most extensive treatment of regional state and trends until the separate *GEO-6* regional reports, as the balance was shifting more toward global state of the environment coverage, a trend that would be confirmed in *GEO-4*.

Chapter 3 on "Human Vulnerability to Environmental Change" is a rather short chapter (less than 20 pages) that mixes a global narrative with manifold examples of vulnerability at the regional and national levels. Therefore, it can be considered a mixed global and regional chapter, having significant regional content.

Chapter 4, "Outlook", looks ahead to 2032, combining qualitative (descriptive narratives) and quantitative approaches using four distinct scenarios. In doing so, *GEO-3* undertook the development of all four scenarios at the regional level, which required a complete series of regional scenario workshops and extensive interactions between the global scenarios team with the seven regional ones. This effort led to the four global scenarios having a significant regional flavour (Chapter 5.2 above on Outlook).

Despite significant regional content in the main state and trends, policy retrospective and outlook chapters, *GEO-3* saw the emergence of global chapters and sections that were now longer than individual regional analyses. Chapter 1 traces environmental governance purely at a global level, and Chapter 5's "Options for Action" also offers only a global treatment of policy actions, addressing a world of haves and have-nots faced with widening divisions, of which the environmental divide is one. While the other three chapters present a mix of global and regional analyses, the global sections precede and are longer than the individual regional sections. Thus *GEO-3* reversed or at the very least evened out the previous regional dominance apparent in *GEO-1* and *GEO-2000*.

The *GEO-4* report confirmed the trend that had begun with *GEO-3* of moving to a more global approach, to the detriment of in-depth regional analyses. For the first time, what before had been separate regional chapters are reduced to a single one in Section C, Chapter 6, "Regional Perspectives: 1987–2007," totalling 105 pages, or about 14 pages per region, out of a full *GEO-4* of 540 pages. This does not imply that the regions, chiefly through regional examples and graphics, are not covered or mentioned elsewhere in *GEO-4*. However, for the first time, global analyses had gained the upper hand in terms of print space, particularly in the state and trends chapters.

Given the prior dominance of regional analyses or at least equality between regional and global treatment, the new format was bitterly protested by

many in the regional teams, both those from the collaborating centres who worked on the regional analyses and those UNEP staff who supervised the teams. Essentially, as time-consuming and expensive efforts were still undertaken to prepare the remaining brief regional sections, it was felt by some that the end analyses did not reflect the heavy investments.

Thus, while the first five chapters of *GEO-4* include some regional examples, they remain primarily global analyses. Later Chapters 7, 8 and 10 are similar in focusing mostly at the global level, with occasional case studies or examples given at the regional and, in some cases, national level. However, the outlook Chapter 9 did undertake "...to explore different policy approaches and societal choices at global and regional levels" (UNEP, 2007b, p. 398). It includes a section, "Key Messages from the Regions," where line and bar charts dominate the brief explanatory text. One-third of the outlook chapter focuses on the regions, and at least two-thirds of the chapter has detailed regional content in trend graphs.

While in *GEO-5* the eight chapters of Part 1 cover the traditional environmental themes at the global level, Part 2 saw the revival of separate regional chapters, not for the purpose of state and trends but rather for conducting the policy analytic work region-by-region. Thus, Chapters 9 to 14 cover the six regions in 25-30 pages each, while an overall "Regional Summary" Chapter 15 provides an overview of the policy analyses in under 20 pages. The concept was for each of the regions to select up to six priority environmental themes and related international goals to be analysed. Most regions chose five themes, as shown in Table 15.1 (UNEP, 2012a, p. 401). Each of these issues/themes is then evaluated in terms of which policies had shown success in achieving the related goals.

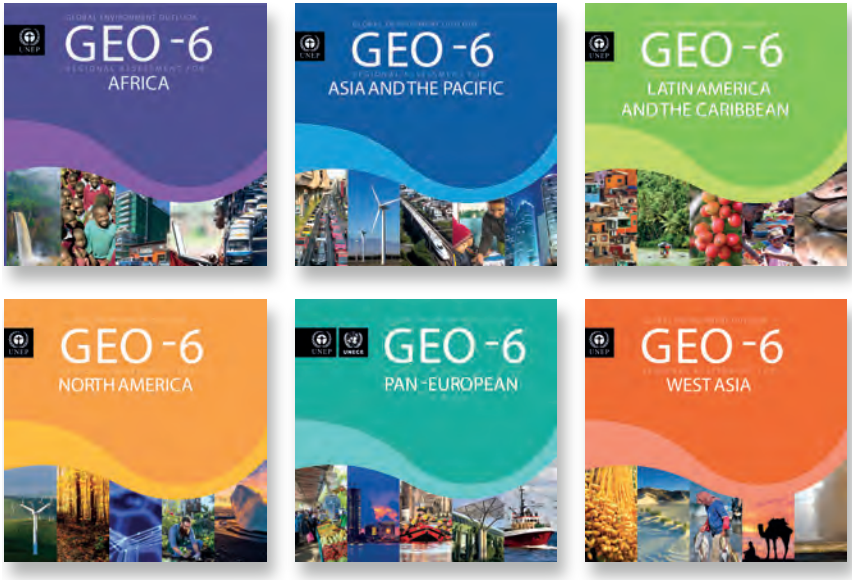
The selection of priority environmental themes and related international goals was accomplished in each case by a Regional Consultation that brought together 50-100 persons from countries of the region. Climate change, freshwater and environmental governance were selected as priorities by all six regions.[15] A fairly rigid policy appraisal methodology was meant to determine which policies offered the most promise in addressing the thematic issues. This, however, proved largely unworkable due to the time required and a lack of expertise among most participants. In the end, a less rigorous approach emerged, with each region completing a chart that documents positive policies.

[15] Four of the six regions treated governance not as a theme as such, but as a background, cross-cutting issue facilitating or restraining progress on a given priority at the regional level.

Finally, there is virtually no regional breakdown in *GEO-5*'s Chapter 16, "Scenarios and Sustainability Transformation," and, therefore, no systematic subglobal futures coverage. This was a striking departure from the scenario work in the four previous editions.

As noted in the Introduction to this section, *GEO-6* took a completely different approach, with six separate regional GEOs developed and published during 2016 (Figure 5.4.1), well before the *GEO-6* global report issued in March 2019 (UNEP, 2016a, 2016b, 2016c, 2016d, 2016e; UNEP and UNECE, 2016). The extent to which the six regional reports were utilized as sources for the global *GEO-6* report appears to have been extremely limited. This would have been a difficult undertaking in any case, given the rather different content and formats of the six individual reports. However, the original intent of the UNEP/GEO management team at the start of the process was to base the global *GEO-6* on the contents of the six regional reports.

Figure 5.4.1. *GEO-6* Regional Reports



The six *GEO-6* regional reports were made available in English and other language versions, plus booklets with key findings and policy messages (UNEP, 2016)

The six *GEO-6* regional reports vary in length by a factor of 2.4, the pan-European one being 376 pages in length and the West Asian report only 156 pages. The average length of the six reports is 260 pages, or about one-third the length of the global *GEO-6*.

Where one might expect to find at least some references to the six regional reports in the scene-setting Chapter 1, "Introduction and Context," of the full *GEO-6*, there are none. Only in Chapter 23 "Bottom-up Initiatives and Participatory Approaches for Outlooks", it is evident that content from the six regional reports was taken into consideration. Section 23.8 (UNEP, 2019e, p. 553) explains how "...region-specific environmental challenges and the key interventions for addressing them..." were extracted from the six regional reports and used. Section 23.10 (UNEP, 2019e, pp. 566–570) highlights and synthesizes policy interventions from the outlook chapters in the six regional assessments, including a chart of how these clustered along thematic lines and another showing how many regions prioritized each type of policy intervention. Otherwise, *GEO-6* is conspicuously missing substantive material from the earlier-produced – and costly – six regional *GEO-6* reports. However, the 190-page Part B, "Policies, Goals, Objectives and Environmental Governance," is full of regional, national and subnational policies as examples.

Analysis of the Global - Regional Balance in the GEO Global Reports

It seems probable – if not 'provable' – that the increasing number of periodic and separate GEO-style regional reports[16] and subregional reports by UNEP and partners contributed to the generally declining ratio of regional to global coverage in the global GEO reports 1 to 6, particularly in the state and trends components. While *GEO-1* had the highest proportion of regional compared to global content and *GEO-3* had the greatest amount of regional content, *GEO-4* saw a sharp decline in regional coverage other than in the outlook. And while *GEO-5* had substantial regional content once again, this was almost entirely on policy analysis and neither in the state and trends nor outlook sections.

However, there is no single moment that can be identified where an explicit decision was ever taken by UNEP management affiliated with the global GEO reports to promote global content over regional. Nor was there a decision to de-emphasize the latter due to the steadily increasing proliferation of regional, subregional and other subglobal GEO reports that can

[16] Including the *Africa Environment Outlooks 1-3, Asia and Pacific Environment Outlooks 1 and 2*, the *GEO Latin America and the Caribbean Reports 1-3*, several *pan-European Environment Assessments* by the European Environment Agency and the *Environment Outlook for the Arab Region*.

be seen from the early 2000s onward (Figures 6.2.1 and 6.2.2). What can be said is that regional bodies, individual governments, donors and other stakeholders, perhaps particularly in the Africa and the Latin America and the Caribbean regions, saw the GEO process and reports as a means to popularize and raise the profile of environmental issues. At the same time, GEO efforts helped participants to standardize regional to local environmental reporting, to become part of a much broader reporting process, and to gain scientific credibility and experience for their own institutions.

In conclusion, the overall trend in global versus regional coverage in the six GEO reports evolved as follows. GEO began by focusing on a regional development context of the worldwide environmental situation and its prospects. This resonated strongly, and many regional groups applied, copied and came to own elements of the GEO process. Gradually, over the various editions, global and cross-scale issues could be given their place in GEO. This was not a fixed place, as the organization of GEO reports in terms of geographical scales, themes and policy focus was constantly experimented with and refreshed. By the time of *GEO-4*, the global-regional rebalancing had evolved towards global coverage with regional examples. But a contrary development is true for GEO's policy analysis, which developed greater and more systematic analysis in the regional development context. To some degree, this applies to the outlook element of GEO as well.

The broad capacity-building efforts that accompanied the proliferation of GEO- and GEO-style reports at subglobal levels helped to put regional bodies, countries and localities in a much better position to take ownership of their own assessment processes in the first decades of the 21st century (Chapter 7.4). In Chapter 6, the immense range of regional and other subglobal reports that stemmed from the global GEO process are described, and their origins and underlying motivations are analysed.

5.5 Other global GEO products

Over the nearly three decades that the global GEO report series evolved, numerous related products were conceived and developed. Quite a few of these can be considered as GEO companion products since they complemented the global editions. Many fall in the realm of process reports. A third general category can be seen as bridging or thematic spin-off products that adopted the term 'outlook' but not the essence of the GEO methodology. These complementary global products vastly expanded the terrain covered by the GEO series and brought many more people into the GEO orbit, both as authors and ultimately as readers/users. Finally, these spin-offs confirmed the broad appeal of the GEO brand by reflecting the old maxim that imitation is the sincerest form of flattery.

Chapter 7.8 provides more details on these three types of additional products, and Annex IV offers a full list of them.