





## The GEO-6 Process



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*“We all share one planet and are one humanity;  
there is no escaping this reality.”*

*Wangari Maathai (1940-2011), Nobel Laureate*

## Objectives, Scope and Process



The Mandate for the sixth Global Environment Outlook was obtained from Member States at the first UN Environment Assembly (resolution 1/4, operative paragraph 8). More information on this mandate can be found in Annex 1-1 of this report. The objectives, scope and process for GEO-6 were defined and adopted in a Final Statement by the Global Intergovernmental and Multi-Stakeholder Consultation that took place in October 2014. It was attended by more than 133 delegates with more than 100 governments represented.

### Objectives

The consultation reaffirmed the UNEA-1 mandate by identifying the following objectives for the assessment:

- ❖ provide a comprehensive, integrated and scientifically credible global environmental assessment to support decision-making processes at appropriate levels;
- ❖ facilitate broader participation by major groups and stakeholders, in particular from the private sector and NGOs and to increase outreach to target audiences;
- ❖ The analysis should draw on diverse knowledge systems, including by using accepted guidelines for the use of peer reviewed scientific literature, grey literature, data and indigenous and local knowledge;
- ❖ A clear process and organizational structure is needed to ensure credibility, legitimacy and relevance;
- ❖ "The assessment should build on and be consistent with previous GEOs, as well as the work of other relevant intergovernmental organizations and processes, including Multilateral Environmental Agreements, in order to maintain its branding and role in keeping the environmental situation under review";<sup>1</sup>
- ❖ inform, as appropriate, the strategic directions of UNEP and other relevant UN bodies;
- ❖ strengthen the policy relevance of GEO-6 by including an analysis of case studies of policy options, that incorporates environmental, economic, social and scientific data and information and their indicative costs and benefits to identify promising policy options to speed up achievement of the internationally agreed goals such as the Sustainable Development Goals and other multilateral environmental agreements;
- ❖ identify data gaps in the thematic issues considered by GEO-6.

### Scope

GEO-6 builds on previous GEO reports and continues to provide an analysis of the state of the global environment, the global, regional and national policy response as well as the outlook for the foreseeable future. It differs from previous GEO reports in its emphasis on Sustainable Development Goals and in providing possible means of accelerating achievement of these goals. GEO-6 is made up of four distinct but closely linked parts.

- ❖ **Part A** assesses the state of the global environment in relation to key internationally agreed goals such as the

Sustainable Development Goals and those of various multilateral environmental agreements. The assessment is based on national, regional and global analyses and datasets.

- ❖ **Part B** provides an analysis of the effectiveness of the policy response to these environmental challenges as well as an analysis of progress towards achieving specific environmental goals.
- ❖ **Part C** reviews the scenarios literature and assesses pathways towards achieving Agenda 2030 as well as achieving a truly sustainable world in 2050.
- ❖ **Part D** identifies future data and knowledge necessary to improve our ability to assess environmental impacts and pathways for achieving sustainability.

The GEO-6 also considers key policy questions. These include:

- ❖ What are the primary drivers of environmental change?
- ❖ What is the current state of the environment and why?
- ❖ How successful have we been in achieving our internationally agreed environmental goals?
- ❖ Have there been successful environmental policies?
- ❖ What are the policy lessons learned and possible solutions?
- ❖ Is the current policy response enough?
- ❖ What are the business as usual scenarios and what does a sustainable future look like?
- ❖ What are the emerging issues and megatrends including their possible impacts?
- ❖ What are the possible pathways to achieving Agenda 2030 and other internationally agreed environmental goals?

### Process

The October 2014 consultation also provided direction for strengthening the process of the GEO-6 assessment, including:

- ❖ The assessment process shall be supported by two main advisory bodies: the High-level Intergovernmental and Stakeholder Advisory Group (HLG) and the Scientific Advisory Panel (SAP);
- ❖ Advice shall also be obtained from an Assessment Methodologies, Data and Information Working Group;
- ❖ Other GEO-6 roles would include: Coordinating Lead Authors (CLAs); Lead Authors; up to 20 GEO-6 Fellows and Coordinators; global experts; regional experts; community of practice moderators; review editors; and reviewers;
- ❖ the CLAs will provide technical summaries of the GEO 6 and prepare the negotiating drafts of the Summary for Policymakers in close collaboration with and under the leadership of the HLG, ensuring that the technical aspects of GEO-6 are reflected in the draft. The SPM would be negotiated at a dedicated intergovernmental and stakeholder meeting;
- ❖ Relevant MEAs, international organizations and scientific institutions will be invited to actively contribute to the GEO-6 process.
- ❖ The GEO-6 will ensure scientific credibility, policy relevance and legitimacy of the assessment by engaging a wide range of stakeholders;
- ❖ The assessment will be subjected to extensive scientific expert peer review and government review;

<sup>1</sup> Outcomes document of the Intergovernmental and Multi-stakeholder consultation, 21-23 October, 2014, Berlin, Germany. The full text of the Outcomes document can be found in the Appendix to this section.



- ❖ The assessment process will continue to target institutional capacity building by engaging developing country experts;
- ❖ The assessment should strive to communicate key messages and findings to target audiences in an accessible manner.

## TIMELINE

The sixth Global Environment Outlook process was characterized by 4 larger authors meetings, two smaller drafting meetings on Outlooks and Policy, as well as face to face meetings of the advisory bodies, Review Editors and Member States. The meeting and drafting schedule followed 3 basic principles established by the advisory bodies:

- ❖ There should be coherence across the different Parts of GEO-6 and the 12 cross-cutting issues should be drafted in tandem with the assessment of the 5 environmental themes.
- ❖ There should be opportunities for robust interaction between the authors and the advisory bodies to ensure both policy relevance and scientific integrity are maintained throughout the process.
- ❖ The author teams should be kept small since the regional assessments contain much of the information that is needed in the global assessment and they should form the foundation of the global assessment.

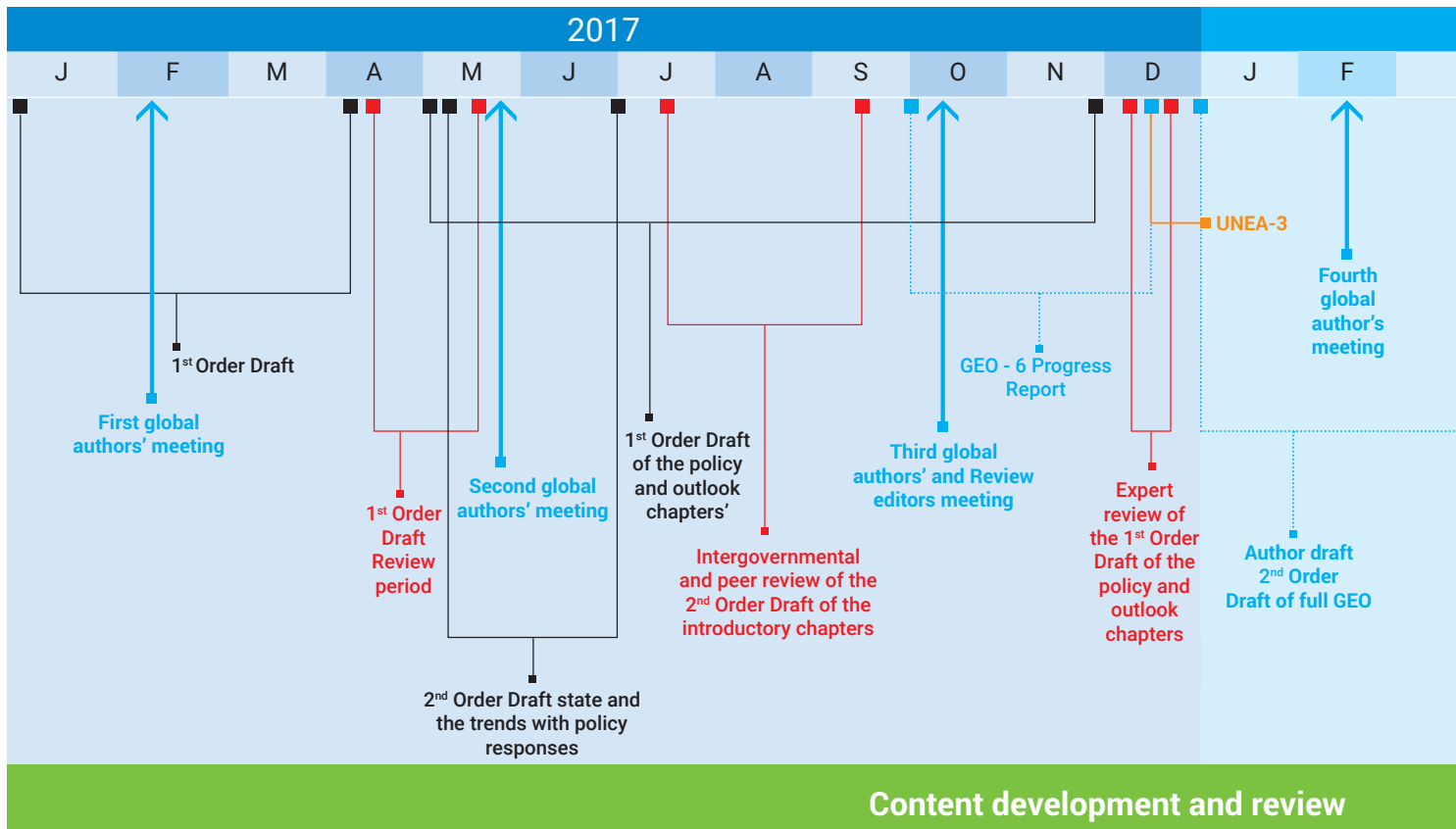
To ensure robust interaction with the advisory bodies, 3 of the 4 larger authors meetings had participation from the High-level Group and the Scientific Advisory Panel. To ensure coherence

across the assessment, the larger meetings were used to allow for 'speed dating' between the thematic chapter authors and the cross-cutting issue authors. This 'speed dating' allowed for 1 hour of discussion between the authors teams where issues were discussed and writing assignments given. To ensure that the author teams were kept small, a core of coordinating lead authors were first selected into the process and then skills gaps were identified. From the skills gap analysis, invitations were sent to lead authors to complement the drafting of the chapters.

As the work programme evolved it became clear that additional authors meetings for the Policy and Outlooks chapters would be needed. The Secretariat proceeded to organize these during the months of May and June, 2018. In addition, the Scientific Advisory Panel requested to meet one last time in order to formulate their opinion on the scientific credibility of the GEO process. This meeting was organized back-to-back with the final Review Editors meeting in October, 2018. This allowed for the two groups to share information about the peer review processes and their overall rigour.

The drafting meeting for the Summary for Policymakers involved the High-level Group, Coordinating Lead Authors as well as the Co-chairs of the assessment. The Co-chairs of the Scientific Advisory Panel also participated as observers and provided some of their experience with drafting of Summaries in other assessment processes.

The final meeting of the GEO process was the meeting of Member States to finalize and adopt the Summary for Policymakers. This meeting was held at UN Environment headquarters which allowed for a broad participation of



## Content development and review



Member States. The 4-day meeting sought to review the text of the Summary and make changes that would allow for its adoption by all Member States present. The final adopted document was submitted to the fourth UN Environment Assembly for endorsement.

## PARTNERSHIPS AND COLLABORATION

The development of GEO-6 involved extensive collaboration both within UN Environment and between UN Environment and a network of multidisciplinary experts and research institutions, all of whom made their valuable time and knowledge available to the process.

The consultation requested that experts for content development, including reviewers and advisory groups, be nominated by governments and other main stakeholders based on their expertise and using a transparent nomination process. The nominated experts were then convened by the UN Environment Secretariat based on their expertise with due consideration of gender and regional balance.

### Chapter expert groups

The GEO-6 report contains 25 chapters. An expert author group was established for each chapter to conceptualize, research, draft, revise and finalize each chapter. More than 150 authors and fellows were involved in content development. Each chapter expert was under the leadership of three or four coordinating lead authors and supported by a UN Environment chapter coordinator. Other members of the chapter expert groups comprised lead authors and contributing authors.

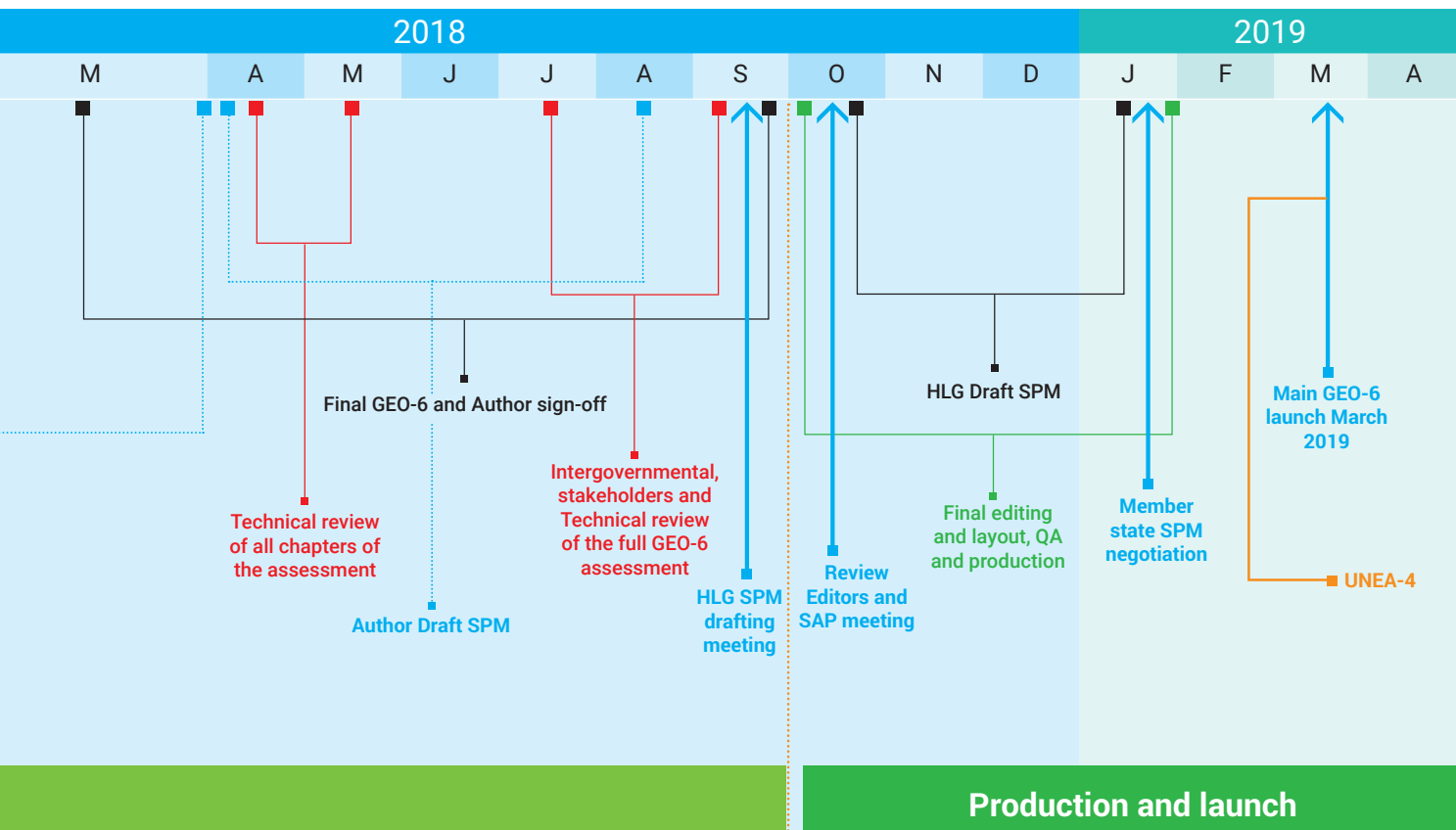
## GEO-6 fellows

GEO-6 continued to pursue the Fellowship initiative established during the GEO-4 process in 2005. This engages early career professionals in the GEO process so that they can gain experience from participating in a major global environmental assessment. A total of 27 fellows from 15 countries participated in GEO-6.

## REVIEW PROCESS

The GEO-6 assessment underwent five rounds of review involving more than 1000 experts. In total the GEO-6 assessment was reviewed five times at different stages of its development and the process yielded more than 14,000 comments. Due to this process, the draft chapters have been re-written, adjusted and edited to improve the quality while the drafting process has been adjusted to improve its effectiveness.

The first nine introductory chapters of the assessment: introduction, drivers of environmental change, state of our data and knowledge, the crosscutting chapter as well as the state of the global environment, across 5 main thematic areas: air, biodiversity, oceans, land and freshwater were reviewed earlier in the process than the policy and outlooks chapters. At the end of the review process all chapters were provided for review by technical experts then for a longer intergovernmental and expert review. For the final review the chapters were provided as individual chapters (25 chapters separately) and as a complete assessment report (all chapters as a single document). This offered reviewers an opportunity to either





review specific chapters that were directly related to their areas of expertise or review the whole assessment report to comment on the report's coherence.

For all review periods the secretariat offered a 'service desk' where all reviewers with questions or concerns were supported in this task. Virtual meetings were organized for all reviewers coordinated by the secretariat to first orient the review team before the start of the review process and then to check on progress as well as answer questions. These virtual meetings were conducted by the secretariat with support from the lead review editors, who listened in and provided advice on any issues. The preparatory review material/tools were discussed during these meetings with the concentration being on the reviewer's guidelines. Terms of reference for the reviewers were developed and updated for each review period, including the ethical responsibilities of GEO-6 Reviewers. During the review period the secretariat conducted follow-up calls for all available reviewers to assess the progress and review important deadlines. All review call recordings were shared with the whole review team to ensure that other reviewers were aware of the tasks and the plan for moving forward.

## **GEO-6 ADVISORY BODIES**

Three external specialized advisory bodies were established to support the assessment process.

### **High-Level Intergovernmental and Stakeholder Advisory Group**

The panel included 33 high-level government representatives from all six UN Environment regions as well as 8-10 key stakeholders. The High-level Group assessed and formulated strategic advice to GEO-6 authors and other groups to assist them in their assessment work. They also provided initial guidance on the structure and content of the GEO-6 Summary for Policymakers and further guidance to the experts in finalizing the draft Summary, in preparation for the final intergovernmental negotiation. In addition, ad-hoc guidance was provided to UN Environment throughout the assessment process to align the GEO-6 process with other relevant global assessments. The High-level Group met face-to-face seven times between 2015 and 2018. The Advisory Group also met virtually on a monthly basis throughout the preparation of the global assessment, from May 2016 to September 2018.

### **Science Advisory Panel**

The Panel included 22 distinguished scientists who met face-to-face five times. The Panel was responsible for providing advice on the scientific credibility of the assessment process. The Panel provided scientific advice; standards and guidelines for the assessment and review process; and reviewed the findings of the mid-term evaluation of the assessment process. The Panel met virtually on a monthly basis throughout the preparation of the global assessment, from June 2016 to October 2018.

### **Assessment Methodologies, Data and Information Working Group**

The working group comprised of 12 professionals who met face-to-face three times between 2015 and 2018 and provided support to the assessment process and provide guidance on the use of core datasets and indicators. They consulted with experts to review the methods used in GEO-6, identify priority environmental indicators as well as data gaps and related issues. The Working Group met virtually as needed throughout the process.

## **CONSULTATION PROCESS**

UNEP organized panel discussions at all authors meetings throughout the assessment process. These panel discussions were intended to delve into specific environmental issues that were relevant to the region and location of the meeting. The following are some of the key meetings convened since the inception of the GEO-6 process.

### **GEO-6 planning meetings**

Two planning meetings were convened with the High-level Group and the Scientific Advisory Panel May and June 2016. The meetings produced a final annotated outline for the global assessment and a list of recommended co-chairs and coordinating lead authors.

### **Global Intergovernmental and Multi-stakeholder Consultation**

This consultation defined and adopted the scope, objectives and process for GEO-6 in October 2014. Participants at the Intergovernmental and Multi-Stakeholder Consultation concluded that GEO-6 would be an integrated environmental assessment using the Drivers – Pressures – State – Impacts – Response (DPSIR) approach. The report would build on regional assessments and include an inter-governmentally negotiated Summary for Policymakers. The analysis would aim to present findings and deliver products to targeted audiences including decision makers, across the public and private sectors, such as businesses and the youth.

### **Outlooks expert meeting**

In May 2018, an outlooks expert group, was convened to move the policy chapters to third order draft quality by addressing all comments from the science editors, as well as comments received from the second order draft technical review period.

### **Policy expert meeting**

In June 2018, a policy expert group, was convened to move the policy chapters to third order draft quality by addressing all comments from the science editors, as well as comments received from the second order draft technical review period.



### Global authors' meetings

Four global production and authors' meetings were convened in February 2017, May 2017, October 2017 and in February 2018 to discuss and develop GEO-6-chapter content and outlines, to address review comments, and to harmonize different approaches and presentation styles.

### Chapter working group meetings

Hundreds of virtual chapter meetings were convened to prepare, review and revise the drafts for individual chapters.

### Summary for Policymakers intergovernmental meeting

A final open-ended intergovernmental meeting was convened from January 21-24, 2019 in Nairobi, Kenya to negotiate and adopt the GEO-6 Summary for Policymakers (SPM). The

meeting attended by 95 Governments adopted the summary, which presents the policy-relevant findings of GEO-6 and is published as a separate document. The GEO-6 Summary for Policymakers was presented to the fourth UN Environment Assembly for endorsement.

The launch of GEO-6 will coincide with the fourth United Nations Environmental Assembly. GEO-6 highlights the current state, trends and outlook for the planet and its people, and showcases more than 35 case studies of policies that have been assessed for their effectiveness.

GEO-6 highlights not just the perils of delaying action, but the options for transforming our economic, environmental and social systems to achieve a truly sustainable world.

Further information is available at <https://www.unenvironment.org/global-environment-outlook>





## Appendix

Statement by the Global Intergovernmental and Multi-stakeholder Consultation on the Sixth Global Environment Outlook held in Berlin from 21 – 23 October 2014

### UNEP/IGMC.2 Rev.2

#### Strengthening the Science Policy Interface:

#### Building the Evidence Base for the Post-2015 Agenda

23 October 2014

#### Organisation of work

The Global Intergovernmental Multi-stakeholder Consultation (IGMS) met in Berlin from 21-23 October 2014. It was attended by 133 delegates, with more than 100 governments represented.

The meeting was opened by Achim Steiner, Executive Director of UNEP.

The election of officials followed. Idunn Eidheim (Norway) and Dr. Majid Shafie-Pour (Iran) were elected Co-Chairs. Dr. Peter Denton (Major Groups and Stakeholders) was elected Rapporteur.

#### Background

Reference was made to the Rio+20 outcome document, earlier Governing Council decisions, and specifically to UNEA Resolutions 4 and 10.

The Secretariat presented the recommendations of the independent evaluation of GEO-5 which stated the need to:

*“(1) facilitate stakeholder engagement; (2) enhance capacity building; (3) increase the use of grey literature and indigenous knowledge; (4) promote relevance at all scales; (5) increase developing country participation; (6) facilitate access to information; (7) use results based management and evidence for evaluations; and (8) improve financial planning and funding.”*

Participants at the IGMS noted the findings of the evaluation and expressed the need to facilitate broader participation by major groups and stakeholders, in particular from the private sector and NGOs and to increase outreach to target audiences. The analysis should draw on diverse knowledge systems, including by using accepted guidelines for the use of peer reviewed scientific literature, grey literature, data and indigenous and local knowledge. A clear process and organizational structure is needed to ensure credibility, legitimacy and relevance. The assessment should build on and be consistent with previous GEOs, as well as the work of other relevant intergovernmental organizations and processes including such as MEAs, in order to maintain its branding and role in keeping the environmental situation under review.

Under Agenda Item Four, the meeting participants discussed options and timing for GEO-6.

#### Structure for the content of GEO-6

Participants at the IGMS supported that GEO-6 would be an integrated environmental assessment, using the Drivers – Pressures – State – Impacts – Response (DPSIR) approach in the GEO conceptual framework. The Report will build on regional assessments and include an inter-governmentally negotiated Summary for Policymakers. The analysis will aim at presenting findings and delivering products to targeted audiences among decision makers, across the public and private sectors at global to local levels.

GEO-6 will reflect three broad, analytical components.

#### Global Environment: State and Trends

The first component will include an analysis of the environmental state and trends for air, biota, land and water and their multiple contributions to environment and human well-being. This will be achieved through an analysis of interactions with cross-cutting issues such as climate change; environmental disasters; food; energy; human health; economic development; resource use; chemicals and waste; and culture and society, and relevant policies.

#### Environmental Policies, Goals and Objectives: A Review of Policy Responses and Options

The second component will provide a policy analysis of the links between the state and trends in the environment and global and regional environmental goals and objectives, including those reflected in national policy responses, and an assessment of progress towards them.

#### Global Environment Outlook

The third component will be comprised of an integrated analysis of megatrends and environmental change, and refer to the outputs of modeling, scenarios and regional outlooks. The analysis will take into account the Global Sustainable Development Report and provide support to the environmental components of the post-2015 agenda.

#### Timing of GEO-6

Participants expressed broad support for the following delivery dates: GEO-6 regional assessments to be delivered by early 2016 and the complete GEO-6 including its Summary for Policymakers to be delivered not later than 2018, at an appropriate event to be determined in consultation between UNEP and governments. Regional assessments will be undertaken during 2015. The Executive Director of UNEP will report on progress to UNEA 2 in 2016.

#### Process and operational structure of GEO-6

Participants also voiced support for the establishment of two advisory bodies: the High-level Intergovernmental and Stakeholder Advisory Group (HLG) and the Scientific Advisory Panel (SAP). There will also be an Assessment Methodologies, Data and Information Working Group. The HLG will include five representatives from each UN region, plus five representatives from the Major Groups and Stakeholders. The SAP will be comprised of three representatives from each UNEP region,

plus up to six global experts. The Assessment Methodologies, Data and Information Working Group will be comprised of three representatives from each UNEP region, plus up to six global experts. Participants expressed a wish to include individuals with indigenous and local knowledge.

Other GEO-6 roles would include: Coordinating Lead Authors (CLAs); Lead Authors; up to 20 GEO-6 Fellows; Global Experts; Regional Experts; Community of Practice Moderators; Review Editors; and Reviewers.

The participants discussed the terms of reference for the operational structure as set out in the Annex 1.

Based on practice from earlier GEOs and other international scientific assessments, the CLAs will provide technical summaries of the GEO 6 and preparing the negotiating drafts of the Summary for Policymakers in close collaboration with and under the leadership of the HLG, ensuring that the technical aspects of GEO-6 are reflected in the draft. The SPM would be negotiated at a dedicated intergovernmental and stakeholder meeting.

It was noted that UNEP Live will be used by the Secretariat to enhance capacity development and to support GEO-6 by providing the platform for the GEO-6 Communities of Practice and the Nominations Portal. UNEP Live will also support the global and regional analyses through relevant data collection related to *inter alia* UNSEEA and indicator development; encouraging sharing and access to national data and information; linking to peer-reviewed literature from various language domains; providing access to indigenous and local knowledge and information drawn from attributable, public sources. Information should also be provided on the benefits of UNEP Live for countries; the roles of MEAs in UNEP Live and on the UNEP Live programme of work.

Support was given for the GEO-6 to use Communities of Practice to encourage sharing of knowledge amongst the various groups, increase stakeholder engagement and support capacity development. CoPs will be established for the major areas of GEO-6 and regional assessments. Capacity development would be supported through the fellowship programme, the implementation of national reporting systems, along with participation in regional environmental information networks and regional assessments.

Relevant MEAs, international organizations and scientific institutions will be invited to actively contribute to the GEO-6 process.

Support was given for the multi-stage peer review, based on the following principles. First the best possible scientific and technical advice should be included to ensure that the assessment represents the latest scientific, technical and socioeconomic findings and is as comprehensive as possible. Second, a broad circulation process ensuring representation of experts not involved in the preparation of the parts they are reviewing, with particular emphasis on involving as many experts from developing countries as possible. Third, the peer-review by governments will include both technical and policy aspects with due respect to the independence of the reviewers. Finally, the multi-stage review process to be balanced, open and transparent. Conflicts of interest will be identified through a process based on those used by IPBES and IPCC.

#### **Nomination process**

Participants emphasized the need for an open and transparent nomination process for all the GEO-6 roles, using the GEO-6 Nominations Portal in UNEP Live. The experts will be nominated using the criteria outlined in Annex II, and be selected by UNEP in a transparent manner with due consideration of the need to ensure geographic, disciplinary and gender balance. The nomination period will run until January 31, 2015. The selection process will be completed by the end of February 28, 2015. Late nominations will be accepted under mitigating circumstances. The selected experts and nominees for the advisory bodies will be sent to governments for review. The list of selected experts will be published on-line.

Governmental representatives for the HLG must be nominated by their respective governments and will act in this capacity. The selection process for the stakeholder representatives will be overseen by the UNEP Major Groups and Stakeholders Branch. The selection procedure for the HLG will be determined within the UN regional groups.

The nomination process will be initiated by a letter from the Secretariat to be sent to governments and Major Groups and Stakeholders. This correspondence will be in the relevant UN language and append details of the GEO-6 processes, including remuneration of experts and a GEO-6 timetable.





## Acronyms and Abbreviations

<b>AaaS</b>	Analytics as a Service	<b>CITES</b>	Convention on International Trade in Endangered Species of Wild Fauna and Flora
<b>ABNJ</b>	areas beyond national jurisdiction	<b>CLRTAP</b>	Convention on Long-range Transboundary Air Pollution
<b>ADB</b>	Asian Development Bank	<b>CLTS</b>	community-led total sanitation
<b>AEM</b>	Agri-environment measures	<b>CMM</b>	cutaneous malignant melanoma
<b>AIDS</b>	Acquired Immune Deficiency Syndrome	<b>CMS</b>	Convention on the Conservation of Migratory Species of Wild Animals
<b>AGGI</b>	Annual Greenhouse Gas Index	<b>CNS</b>	central nervous system
<b>ALRTI</b>	acute lower respiratory infections	<b>CO</b>	carbon monoxide
<b>AMAP</b>	Arctic Monitoring and Assessment Programme	<b>CO<sub>2</sub></b>	carbon dioxide
<b>AMCEN</b>	African Ministerial Conference on the Environment	<b>COMEAP</b>	Committee on the Medical Effects of Air Pollutants
<b>AMD</b>	acid mine drainage	<b>CONAFOR</b>	National Forestry Commission of Mexico
<b>AOC</b>	Areas of Concern	<b>COP</b>	Conference of the Parties
<b>ASEAN</b>	Association of Southeast Asian Nations	<b>COPD</b>	chronic obstructive pulmonary disease
<b>ASGM</b>	artisanal and small scale gold mining	<b>CORSIA</b>	Carbon Offsetting and Reduction Scheme for International Aviation
<b>BACT</b>	best available control technology	<b>CSDH</b>	Commission on Social Detriments of Health
<b>BaP</b>	benzo[a]pyrene	<b>CSIRO</b>	Commonwealth Scientific and Industrial Research Organisation (Australia)
<b>BAT</b>	best available techniques	<b>CSML</b>	Climate Science Model Language
<b>BAU</b>	business-as-usual	<b>CSO</b>	civil society organization
<b>BC</b>	black carbon	<b>DaaS</b>	Data as a Service
<b>BECCS</b>	Bioenergy with carbon capture and storage	<b>DALY</b>	disability adjusted life year
<b>BEV</b>	battery electric vehicles	<b>DDT</b>	dichlorodiphenyltrichloro-ethane
<b>CA</b>	conservation agriculture	<b>DEFRA</b>	Department for Environment, Food and Rural Affairs (United Kingdom of Great Britain and Northern Ireland)
<b>CaCO<sub>3</sub></b>	calcium carbonate	<b>DESD</b>	UN Decade of Education for Sustainable Development (UNCCD)
<b>CAP</b>	Common Agricultural Policy (EU)	<b>DFO</b>	Department of Fisheries and Oceans (Canada)
<b>CAS</b>	Chemical Abstract Service	<b>DIF</b>	Directory Interchanged Format
<b>CBMIS</b>	community-based monitoring and information systems	<b>DLDD</b>	desertification, land degradation and drought (UNCCD)
<b>CBD</b>	Convention on Biological Diversity	<b>DPSIR</b>	drivers, pressures, state, impacts, responses
<b>CBMIS</b>	Community-based monitoring and information systems	<b>DRR</b>	disaster risk reduction
<b>CBO</b>	Congressional Budget Office	<b>DSI</b>	dust storm intensity
<b>CCAC</b>	Climate and Clean Air Coalition for the Reduction of Short-Lived Climate Pollutants	<b>DSF</b>	desert storm frequency
<b>CCAK</b>	Clean Cookstoves Association of Kenya	<b>DWAF</b>	Department of Water Affairs and Forestry (South Africa)
<b>CCAMLR</b>	Conservation for the Antarctic Marine Living Resources	<b>EAP</b>	Environmental Action Programme (EU)
<b>CCB</b>	China Construction Bank Corporation	<b>EBA</b>	ecosystem-based adaptation
<b>CCE</b>	climate change education	<b>EBAFOSA</b>	Ecosystem Based Adaptation for Food Security Assembly
<b>CCFSC</b>	Central Committee for Flood and Storm Control	<b>EC</b>	European Commission
<b>CCP</b>	command and control policies	<b>ECLAC</b>	United Nations Economic Commission for Latin America and the Caribbean
<b>CFC</b>	chlorofluorocarbon	<b>EDC</b>	endocrine-disrupting chemicals
<b>CCS</b>	carbon capture and storage	<b>EEA</b>	European Environment Agency
<b>CD</b>	compact disk	<b>EGA</b>	Environmental Goods Agreement
<b>CDC</b>	Centre for Disease Control and Prevention (United States)		
<b>CEC</b>	1) contaminants of emerging concern, or 2) Commission for Environmental Cooperation (under NAFTA)		
<b>CEDS</b>	Community Emissions Data System		
<b>CENESTA</b>	Centre for Sustainable Development and Environment		
<b>CFC-11</b>	trichlorofluoromethane		
<b>CH<sub>4</sub></b>	methane		



<b>EIA</b>	1) Energy Information Administration (United States of America), or 2) environmental impact assessment	<b>GLOBE</b>	Global Learning and Observation to Benefit the Environment
<b>EID</b>	emerging infectious diseases	<b>GLRI</b>	Great Lakes Restoration Initiative
<b>EIP</b>	economic incentive policies	<b>GM</b>	genetically modified
<b>ELD</b>	Economics of Land Degradation Initiative	<b>GMACC</b>	Global Military Advisory Council on Climate Change
<b>EML</b>	Ecological Metadata Language	<b>GMO</b>	genetically modified organism
<b>ENGO</b>	Environmental Non-Governmental Organizations	<b>GMSL</b>	Global Mean Sea Level
<b>EPA</b>	1) environmental performance assessment, or 2) Environmental Protection Agency (United States)	<b>GNH</b>	Gross National Happiness
<b>EPI</b>	environmental policy integration	<b>GPA</b>	Global Program of Action for the Protection of the Marine Environment from Land-based Activities
<b>ESA</b>	1) environmentally sensitive area, or 2) European Space Agency	<b>GRI</b>	Global Reporting Initiative
<b>ESD</b>	Education for Sustainable Development	<b>GSP</b>	Generalized Scheme of Preferences
<b>ESDIS</b>	Earth Science Data and Information System	<b>GtCO<sub>2</sub></b>	gigatonne of carbon dioxide
<b>EU</b>	European Union	<b>GTP</b>	Global Temperature Potential
<b>FAO</b>	Food and Agriculture Organization of the United Nations	<b>GW</b>	gigawatt
<b>FBS</b>	food balance sheet (FAO)	<b>GWG</b>	Global Working Group
<b>FBSP</b>	Free Basic Sanitation Policy	<b>GWP</b>	1) Global Water Partnership, or 2) global warming potential
<b>FBWP</b>	free basic water policy	<b>ha</b>	hectares
<b>FIT</b>	feed-in tariff	<b>HALE</b>	health adjusted life expectancy
<b>FSC</b>	Forest Stewardship Council	<b>HCFC</b>	hydrochlorofluorocarbon
<b>G7</b>	Group of Seven (Canada, France, Germany, Italy, Japan, United Kingdom, United States)	<b>HEI</b>	Health Effects Institute
<b>GACC</b>	Global Alliance for Clean Cookstoves	<b>HFC</b>	hydrofluorocarbon
<b>GAEC</b>	Good Agricultural and Environmental Conditions (EU)	<b>Hg</b>	mercury
<b>GAP</b>	Global Action Programme on Education for Sustainable Development	<b>HIV</b>	human immunodeficiency virus
<b>GAWSIS</b>	Global Atmospheric Watch Station Information System	<b>HLPF</b>	High-level Political Forum on Sustainable Development
<b>GBD</b>	Global Burden of Disease	<b>HS</b>	Harmonized System
<b>GBR</b>	Great Barrier Reef	<b>IAEG</b>	1) Inter-agency and Expert Group, or 2) Internationally Agreed Environmental Goals
<b>GBRMPA</b>	Great Barrier Reef Marine Park Authority	<b>IAM</b>	integrated assessment model
<b>GCM</b>	1) general circulation model, or 2) Global Climate Model	<b>IAS</b>	invasive alien species
<b>GDI</b>	Gasoline direct injection	<b>ICAO</b>	International Civil Aviation Organization
<b>GDP</b>	gross domestic product	<b>ICCA</b>	indigenous and community- conserved areas
<b>GEA</b>	Global Environmental Assessment	<b>ICCT</b>	International Council on Clean Transportation
<b>GEF</b>	Global Environment Facility	<b>ICMM</b>	International Council of Mining and Metals
<b>GEMI</b>	UN-Water's Integrated Monitoring Initiative	<b>ICP</b>	International Cooperative Program
<b>GEO</b>	Global Environment Outlook	<b>ICPDR</b>	International Commission for the Protection of the Danube River
<b>GEOSS</b>	Global Earth Observation System of Systems	<b>ICS</b>	improved cookstove
<b>GESAMP</b>	Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection	<b>ICT</b>	information and communication technology
<b>GGEO</b>	Global Gender and Environment Outlook	<b>IDMC</b>	Internal Displacement Monitoring Centre
<b>GGW</b>	Great Green Wall (China)	<b>IDP's</b>	internally displaced people
<b>GHG</b>	greenhouse gas	<b>IEA</b>	1) International Energy Agency, or 2) integrated environmental assessment
<b>GIS</b>	geographical information systems	<b>IFAW</b>	International Fund for Animal Welfare
<b>GLADIS</b>	Global Land Degradation Information System	<b>IFPRI</b>	International Food Policy Research Institute
<b>GLASOD</b>	Global Assessment of Human-Induced Soil Degradation	<b>IGRAC</b>	International Groundwater Resource Assessment Centre
		<b>IIED</b>	International Institute for Environment and Development
		<b>IJC</b>	International Joint Commission
		<b>IK</b>	indigenous knowledge



<b>ILBM</b>	Integrated Lake Basin Management	<b>N<sub>2</sub>O</b>	nitrous oxide
<b>ILO</b>	International Labour Organization	<b>NAAQS</b>	National Ambient Air Quality Standards (United States)
<b>IMO</b>	International Maritime Organization	<b>NAP</b>	National Adaptation Plan
<b>INBO</b>	International Network of Basin Organizations	<b>NASA</b>	National Aeronautics Space Administration (United States)
<b>INDC</b>	Intended Nationally Determined Contribution	<b>NAZCA</b>	Non-State Actor Zone for Climate Action
<b>INTERPOL</b>	International Criminal Police Organization	<b>NBS</b>	Nature-based solutions
<b>IPLC</b>	Indigenous Peoples and Local Communities	<b>NBSAP</b>	National Biodiversity Strategies and Action Plans
<b>IPAT</b>	Impact = Population x Affluence x Technology	<b>NcML</b>	netCDF Markup Language
<b>IPBES</b>	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services	<b>NCP</b>	nature's contribution to people
<b>IPCC</b>	Intergovernmental Panel on Climate Change	<b>NCSDs</b>	National Councils for Sustainable Development
<b>IRDA</b>	Iksandar Regional Development Authority	<b>NDC</b>	nationally determined contribution
<b>ISA</b>	International Seabed Authority	<b>NDVI</b>	Normalized Difference Vegetation Index
<b>ISO</b>	International Organization for Standardization	<b>NEPA</b>	National Environment Policy Act (United States)
<b>ITF</b>	International Transport Forum	<b>NFCP</b>	Natural Forest Conservation Program (China)
<b>ITPS</b>	Intergovernmental Technical Panel on Soils	<b>NGO</b>	non-governmental organization
<b>ITQ</b>	Individual Transferable Quota	<b>NH<sub>3</sub></b>	ammonia
<b>IUCN</b>	International Union for the Conservation of Nature and Natural Resources	<b>NIP</b>	National Implementation Plan
<b>IUU</b>	illegal, unreported and unregulated fishing	<b>NMVOC</b>	non-methane volatile organic compounds
<b>IWRM</b>	integrated water resources management	<b>NO<sub>2</sub></b>	nitrogen dioxide
<b>JMP</b>	Joint Monitoring Programme for Water Supply and Sanitation of WHO/UNICEF	<b>NOAA</b>	National Oceanic and Atmospheric Administration (United States)
<b>JRC</b>	Joint Research Centre (European Commission)	<b>NOWPAP</b>	Action Plan for the Protection, Management and Development of the Marine and Coastal Development of the Northwest Pacific Region
<b>LA</b>	local authorities	<b>NO<sub>x</sub></b>	nitrogen oxides
<b>LAC</b>	Latin America and the Caribbean	<b>NPP</b>	net primary productivity
<b>LAER</b>	lowest achievable emission rate	<b>NSPS</b>	New Source Performance Standards
<b>LANCE</b>	Land, Atmosphere near real-time Capability for Earth Observing System	<b>NT</b>	no-tillage
<b>LCT</b>	low carbon technology	<b>O<sub>3</sub></b>	ozone
<b>LDN</b>	Land Degradation Neutrality (UNCCD)	<b>OC</b>	organic carbon
<b>LMO</b>	living modified organism	<b>OCP</b>	organochlorine pesticides
<b>LMMA</b>	Locally Managed Marine Areas	<b>ODA</b>	official development assistance
<b>LPG</b>	liquefied petroleum gas	<b>ODS</b>	ozone-depleting substance
<b>LPI</b>	Living Planet Index	<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>LSF</b>	large-scale fisheries	<b>OSCAR</b>	Observing Systems Capability Analysis and Review
<b>LTEMP</b>	Glen Canyon Dam Long-term Experimental and Management Plan	<b>OSPAR</b>	Convention for the Protection of the Marine Environment of the North-East Atlantic
<b>MAP</b>	Mediterranean Action Plan for the Barcelona Convention	<b>PA</b>	protected area
<b>MARPOL</b>	International Convention for the Prevention of Pollution from Ships	<b>PACC</b>	Pacific Adaptation to Climate Change
<b>MCA</b>	Minerals Council of Australia	<b>PAME</b>	protected area management effectiveness
<b>MDG</b>	Millennium Development Goal	<b>PAH</b>	polycyclic aromatic hydrocarbons
<b>MEA</b>	1) Multilateral Environmental Agreement, or 2) Millennium Ecosystem Assessment	<b>PAR</b>	protect, accommodate and retreat
<b>MEB</b>	multiple evidence base	<b>PAWS</b>	Protection of Asian Wildlife Species
<b>MPA</b>	marine protected area	<b>Pb</b>	lead
<b>MRV</b>	measurement, reporting, and verification	<b>PBDE</b>	polybrominated diphenyl ethers
<b>MSY</b>	maximizing sustainable yield	<b>PBT</b>	persistent, bioaccumulative toxic chemicals
<b>MTFR</b>	maximum technologically feasible reduction	<b>PCB</b>	Polychlorinated biphenyls
<b>MUDP</b>	Environmental Technology Development and Demonstration Program (Denmark)	<b>PCFV</b>	Partnership for Clean Fuel and Vehicles
<b>MUFPP</b>	Milan Urban Food Policy Pact	<b>PCN</b>	Polychlorinated naphthalenes



<b>PEER</b>	Publishing and the Ecology of European Research	<b>SFM</b>	sustainable forest management
<b>PES</b>	payment for ecosystem services	<b>SGSV</b>	Svalbard Global Seed Vault
<b>PFAS</b>	per- and polyfluoroalkyl substances	<b>SIA</b>	Sustainability Impact Assessment
<b>PFC</b>	perfluorinated chemicals	<b>SIDS</b>	small island developing states
<b>PFI</b>	port fuel injection	<b>SLCP</b>	short-lived climate pollutant
<b>PHE</b>	phenanthrene	<b>SLM</b>	sustainable land management
<b>PM</b>	particulate matter	<b>SO<sub>2</sub></b>	sulphur dioxide
<b>PM<sub>10</sub></b>	particulate matter with a diameter of 10 micrometres (0.01 millimetre) or less	<b>SPC</b>	1) Secretariat of the Pacific Community, or 2) South Pacific Community
<b>PM<sub>2.5</sub></b>	particulate matter with a diameter of 2.5 micrometres (0.0025 millimetre) or less	<b>SPREP</b>	Secretariat of the Pacific Regional Environment Programme
<b>POPs</b>	persistent organic pollutants	<b>SSA</b>	Sub-Saharan Africa
<b>PoWPA</b>	Programme of Work on Protected Areas	<b>SSF</b>	small-scale fisheries
<b>PPP</b>	1) purchasing power parity or, 2) public private partnership	<b>SSP</b>	Shared Socio-economic Pathway
<b>PPSR</b>	Public Participation in Scientific Research	<b>SST</b>	sea surface temperature
<b>PRTR</b>	Pollutant Release and Transfer Registers	<b>TAC</b>	total allowable catch
<b>R&amp;D</b>	research and development	<b>TCDD</b>	Tetra-chlorodibenzo-dioxin
<b>RACT</b>	Reasonably Available Control Technology	<b>TEEB</b>	The Economics of Ecosystems and Biodiversity
<b>RBFM</b>	rights-based fisheries management	<b>TEK</b>	traditional ecological knowledge
<b>RBG</b>	Royal Botanic Garden, Kew	<b>TK</b>	traditional knowledge
<b>RBM</b>	resilience-based management	<b>TNRSF</b>	Three Northern Regions Shelter Forest (China)
<b>RBO</b>	River Basin Organizations	<b>TOAR</b>	Tropospheric O <sub>3</sub> Assessment Report
<b>RCP</b>	Representative Concentration Pathways	<b>TSD</b>	Trade and Sustainable Development
<b>RD&amp;D</b>	research, development and demonstration	<b>TURF</b>	Territorial Use Rights for Fishing
<b>REACH</b>	Registration, Evaluation, Authorisation and Restriction of Chemical (EU)	<b>TWAP</b>	Transboundary Waters Assessment Programme
<b>REC</b>	renewable energy credits	<b>U5MR</b>	under-five mortality rate
<b>REDD</b>	Reducing Emissions from Deforestation and Forest Degradation	<b>UK</b>	United Kingdom
<b>RES</b>	renewable energy systems	<b>UN</b>	United Nations
<b>RFMO</b>	regional fisheries management organizations	<b>UNCCD</b>	United Nations Convention to Combat Desertification
<b>RLI</b>	Red List Index	<b>UNCDF</b>	United Nations Capital Development Fund
<b>ROD</b>	Record of Decision	<b>UNCLOS</b>	United Nations Convention on the Law of the Sea
<b>RPS</b>	renewable portfolio standard	<b>UNCSD</b>	United Nations Commission on Sustainable Development
<b>SaaS</b>	Software as a Service	<b>UNCTAD</b>	United Nations Conference on Trade and Development
<b>SADC</b>	Southern African Development Community	<b>UNDP</b>	United Nations Development Programme
<b>SAICM</b>	Strategic Approach to International Chemicals Management	<b>UNDRIP</b>	United Nations Declaration on the Rights of Indigenous People
<b>SBI</b>	Subsidiary Body for Implementation	<b>UNECE</b>	United Nations Economic Commission for Europe
<b>SBSTTA</b>	Subsidiary Body on Scientific, Technical and Technological Advice	<b>UNECLAC</b>	United Nations Economic Commission for Latin America and the Caribbean
<b>SCBD</b>	Secretariat of the Convention on Biological Diversity	<b>UNEP</b>	United Nations Environment Programme
<b>SDG</b>	Sustainable Development Goal	<b>UNEP-DHI</b>	United Nations Environment Programme – Institute for Water and Environment
<b>SDGIO</b>	Sustainable Development Goals Interface Ontology	<b>UN-GGIM</b>	United Nations Committee of Experts on Global Geospatial Information Management
<b>SDMX</b>	Statistical Data and Metadata Exchange	<b>UNEP-UNECE</b>	United Nations Environment Programme – Economic Commission for Europe
<b>SDS</b>	sand and dust storms	<b>UNEP-WCMC</b>	United Nations Environment Programme – World Conservation Monitoring Centre
<b>SDS-WAS</b>	Sand and Dust Storm Warning Advisory and Assessment System	<b>UNESCAP</b>	United Nations Economic and Social Commission for Asia and the Pacific
<b>SEA</b>	strategic environmental assessment		
<b>SEEA</b>	System of Environmental-Economic Accounting		
<b>SensorML</b>	Sensor Model Language		
<b>SFA</b>	State Forestry Administration (China)		



<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organization	<b>VME</b>	vulnerable marine ecosystems
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change	<b>VOC</b>	volatile organic compounds
<b>UNFPA</b>	United Nations Population Fund	<b>VWE</b>	vulnerable marine ecosystems
<b>UNGA</b>	United Nations General Assembly	<b>WAD</b>	World Atlas of Desertification
<b>UNHCR</b>	United Nations High Commissioner for Refugees	<b>WASH</b>	water, sanitation and hygiene
<b>UNICEF</b>	United Nations International Children's Emergency Fund	<b>WAVES</b>	Wealth Accounting and the Valuation of Ecosystem Services
<b>UNIDO</b>	United Nations Industrial Development Organization	<b>WBCSD</b>	World Business Council for Sustainable Development
<b>UNISDR</b>	United Nations Office for Disaster Risk Reduction	<b>WDPA</b>	World Database on Protected Areas
<b>UNODC</b>	UN Office on Drugs and Crime	<b>WEF</b>	World Economic Forum
<b>UNSCN</b>	United Nations System Standing Committee on Nutrition	<b>WFD</b>	Waste Framework Directive of the EU
<b>UNSDSN</b>	United Nations Sustainable Development Solutions Network	<b>WFW</b>	Working for Water programme
<b>US EPA</b>	United States Environmental Protection Agency	<b>WHC</b>	World Heritage Convention
<b>USA</b>	United States of America	<b>WHO</b>	World Health Organization
<b>USAID</b>	United States Agency for International Development	<b>WIPO</b>	World Intellectual Property Organization
<b>UV</b>	ultraviolet	<b>WMO</b>	World Meteorological Organization
<b>VGGT</b>	FAO Voluntary Guidelines on the Responsible Governance of Tenure	<b>WOCAT</b>	World Overview of Conservation Approaches and Technologies
		<b>WRI</b>	World Resources Institute
		<b>WTO</b>	World Trade Organization
		<b>WWAP</b>	World Water Assessment Programme
		<b>WWF</b>	World Wide Fund for Nature
		<b>WWF-SA</b>	World Wide Fund for Nature, South Africa
		<b>ZSL</b>	Zoological Society of London



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## Glossary



This glossary is compiled from citations in different chapters, and draws from glossaries and other resources available on the websites of the following organizations, networks and projects:

American Academy of Ophthalmology; American Meteorological Society; Asian Development Bank ; Biodiversity Journal; Business Dictionary; Business Dictionary ; Cambridge Dictionary; Center for Transportation Excellence (United States); Centers for Disease Control and Prevention; Charles Darwin University(Australia); Collins Dictionary; Consultative Group on International Agricultural Research; Convention on Biological Diversity; Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar); Department of Agriculture (United States); Department of the Interior (United States); Department of Transportation (United States); Deutsche Gesellschaft für Internationale Zusammenarbeit, GmbH, GIZ; Edwards Aquifer Website (United States); Encyclopaedia Britannica; Encyclopedia of Earth; Energy Information Administration (United States); Environmental Protection Agency (United States); Environmental Science and Pollution Research; Europe's Information Society; European Commission; European Environmental Agency; European Nuclear Society; Farlex Free; Food and Agriculture Organization of the United Nations, Foundation for Research; Gender GEO; Global Earth Observation System of Systems; Global Environment Outlook Sixth Edition; Global Footprint Network ; Global Land Outlook; Glossary of Environment Statistics; GreenFacts Glossary; Hayes' Handbook of Pesticide Toxicology; Healthline; IGI Global; Illinois Clean Coal Institute (United States); Illuminating Engineering Society of North America; Industrial Organisation Economics and Competition Law; Intellectual Property Organization; Intergovernmental Panel on Climate Change; Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services; International Centre for Research in Agroforestry; International Comparison Program; International; Federation of Organic Agriculture Movements; International Research Institute for Climate and Society at Columbia University (United States); International Strategy for Disaster Reduction; International Union for Conservation of Nature; Journal of Pharmaceutical Microbiology; Journal of the Association for Information Science and Technology; Lyme Disease Foundation (United States); Manual Práctico de Ecodiseño; Medical Dictionary; Merriam-Webster Dictionary; Millennium Ecosystem Assessment; Ministerial Conference on the Protection of Forests in Europe; Ministry of Environment New Zealand; Ministry of Rural Development (Malaysia); MIT Press; National Aeronautics Space Administration (United States); National Bureau of Economic Research; National Cancer Institute (United States); National Center for Biotechnology Information (United States); National Geographic; National Heart, Lung and Blood Institute (United States); National Oceanic and Atmospheric Administration (United States); National Safety Council (United States); National Snow and Ice Data Centre (United States); Natsource (United States); Organisation for Economic Co-operation and Development; Organisation for Economic Co-operation and Development; Oxford Dictionary; PPP Knowledge Lab; Professional Development for Livelihoods (United Kingdom of Great Britain and Northern Ireland); RadioPaedia; Redefining Progress (United States); SafariX eTextbooks Online; Science and Technology (New Zealand); Science Dictionary; SDG Knowledge platform; Semantic Scholar.org; SER Primer; The IUP Journal of Applied Economics; TheFreeDictionary.com; Tirana Declaration; UN Environment; UN-Habitat; United Nations Convention to Combat Desertification; United Nations Development Group; United Nations Development Programme; United Nations Development Programme; United Nations Economic and Social Commission for Asia and the Pacific; United Nations Educational, Scientific and Cultural Organization; United Nations Framework Convention on Climate Change ; United Nations Industrial Development Organization; United Nations International Strategy for Disaster Reduction; United Nations Statistics Division; United Nations Water; United Nations Women; United State Geological Survey; University of Sydney; USLegal.com; Water Footprint Network, (Netherlands); Water Quality Association (United States); Wikipedia; World Bank; World Health Organization; World Health Organization; World Meteorological Organization; World Wide Fund for Nature

### **Abundance**

The number of individuals or related measure of quantity (such as biomass) in a population, community or spatial unit.

### **Abrupt change**

The change that takes place so rapidly and unexpectedly that human or natural systems have difficulty adapting to it.

### **Acidification**

Change in natural chemical balance caused by an increase in the concentration of acidic elements.

### **Acidity**

A measure of how acid a solution may be. A solution with a pH of less than 7.0 is considered acidic.

### **Adaptation**

Adjustment in natural or human systems to a new or changing environment, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation.

### **Adaptive capacity**

The ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

### **Adaptive governance**

A governance approach that incorporates methods of adaptive management, adaptive policy making and transition management for addressing complex, uncertain and dynamic issues. Adaptive governance relies on polycentric institutional arrangements for decision making at multiple scales. Spanning the local and global levels, this form of governance provides for collaborative, flexible, learning-based approaches to ecosystem management.

### **Aeroponics**

A plant-cultivation technique in which the roots hang suspended in the air while nutrient solution is delivered to them in the form of a fine mist climate geoengineering

**Afforestation**

Establishment of forest plantations on land that is not classified as forest.

**Aflatoxin**

Aflatoxins are poisonous substances produced by certain kinds of fungi (moulds) that are found naturally all over the world; they can contaminate food crops and pose a serious health threat to humans and livestock. Aflatoxins also pose a significant economic burden, causing an estimated 25 per cent or more of the world's food crops to be destroyed annually.

**Agglomeration economies**

The benefits that come when firms and people locate near one another together in cities and industrial clusters. These benefits all ultimately come from transport costs savings: the only real difference between a nearby firm and one across the continent is that it is easier to connect with a neighbor.

**Agricultural intensification**

Agricultural intensification can be technically defined as an increase in agricultural production per unit of inputs (which may be labour, land, time, fertilizer, seed, feed or cash). For practical purposes, intensification occurs when there is an increase in the total volume of agricultural production that results from a higher productivity of inputs, or agricultural production is maintained while certain inputs are decreased (such as by more effective delivery of smaller amounts of fertilizer, better targeting of plant or animal protection, and mixed or relay cropping on smaller fields). Intensification that takes the form of increased production is most critical when there is a need to expand the food supply, for example during periods of rapid population growth. Intensification that makes more efficient use of inputs may be more critical when environmental problems or social issues are involved. In either case, changes caused by intensification are to be understood conceptually in contrast to extensive adjustments, which involve increases or decreases in the amount of inputs used. Historically, the most common and effective extensive adjustment in agricultural production has been to increase or decrease the area of land planted.

**Agroecology**

An ecological approach to agriculture that views agricultural areas as ecosystems and is concerned with the ecological impact of agricultural practices.

**Agroecosystems**

Organisms and environment of an agricultural area considered as an ecosystem.

**Agrotechnology**

The application of technology in agriculture.

**Albedo**

The fraction of solar energy that is diffusely reflected from the Earth back into space. It shows how reflective earth's surface is.

**Alienation**

Unlawfully transferring records or losing custody of them to an unauthorized organization or person.

**Alien species (also non-native, non-indigenous, foreign, exotic)**

Species accidentally or deliberately introduced outside its normal distribution.

**Alkalinisation**

A process that lowers the amount of acid in a solution. In medicine, an alkali, such as sodium bicarbonate, may be given to patients to lower high levels of acid in the blood or urine that can be caused by certain medicines or conditions.

**All-cause mortality**

All of the deaths that occur in a population, regardless of the cause. It is measured in clinical trials and used as an indicator of the safety or hazard of an intervention.

**Anthropocene**

A term used by scientists to name a new geologic epoch (following the most recent Holocene) characterized by significant changes in the Earth's atmosphere, biosphere and hydrosphere due primarily to human activities.

**Antimicrobial resistance**

The ability of a microorganism (like bacteria, viruses, and some parasites) to stop an antimicrobial (such as antibiotics, antivirals and antimalarials) from working against it. As a result, standard treatments become ineffective, infections persist and may spread to others.

**Aquatic ecosystem**

Basic ecological unit composed of living and non-living elements interacting in water.

**Aquifer**

An aquifer is an underground layer of water-bearing rock. Water-bearing rocks are permeable, meaning they have openings that liquids and gases can pass through. Sedimentary rock such as sandstone, as well as sand and gravel, are examples of water-bearing rock. The top of the water level in an aquifer is called the water table.

**Arable land**

Land under temporary crops (double-cropped areas are counted only once), temporary meadows for mowing or pasture, land under market and kitchen gardens, and land temporarily fallow (less than five years). The abandoned land resulting from shifting cultivation is not included in this category.

**Asymptote**

A line that continually approaches a given curve but does not meet it at any finite distance.

**Benthic**

Of, relating to, or occurring at the bottom of a body of water.

**Billion**

10<sup>9</sup> (1 000 000 000).

**Bioaccumulation**

The increase in concentration of a chemical in organisms. Also used to describe the progressive increase in the amount of a chemical in an organism resulting from rates of absorption of a substance in excess of its metabolism and excretion.

**Biocapacity**

The capacity of ecosystems to produce useful biological materials and to absorb waste materials generated by humans, using current management schemes and extraction technologies. The biocapacity of an area is calculated by multiplying the actual physical area by the yield factor and the appropriate equivalence factor. Biocapacity is usually expressed in units of global hectares.

**Biochemical Oxygen Demand**

A measure of the organic pollution of water: the amount of oxygen, in mg per litre of water, absorbed by a sample kept at 20°C for five days.

**Biodiversity (a contraction of biological diversity)**

The variety of life on Earth, including diversity at the genetic level, among species and among ecosystems and habitats. It includes diversity in abundance, distribution and behavior, as well as interaction with socio-ecological systems. Biodiversity also incorporates human cultural diversity, which can both be affected by the same drivers as biodiversity, and itself has impacts on the diversity of genes, other species and ecosystems.

**Bioenergy**

Renewable energy produced by living organisms.

**Biofuel**

Fuel produced from dry organic matter or combustible oils from plants, such as alcohol from fermented sugar or maize, and oils derived from oil palm, rapeseed or soybeans.

**Biogas**

Gas, rich in methane, which is produced by the fermentation of animal dung, human sewage or crop residues in an airtight container.

**Biogeochemical cycles**

The flow of chemical elements and compounds between living organisms (biosphere) and the physical environment (atmosphere, hydrosphere, lithosphere).

**Biomass**

Organic material, above and below ground and in water, both living and dead, such as trees, crops, grasses, tree litter and roots.

**Biomagnification**

The build-up of certain substances in the bodies of organisms at higher trophic levels of food webs. Organisms at lower trophic levels accumulate small amounts. Organisms at the next higher level of the food chain eat many of these lower-level organisms and hence accumulate larger amounts. The tissue concentration increases at each trophic level in the food web when there is efficient uptake and slow elimination.

**Biome**

The largest unit of ecosystem classification that is convenient to recognize below the global level. Terrestrial biomes are typically based on dominant vegetation structure (such as forest or grassland). Ecosystems within a biome function in

a broadly similar way, although they may have very different species composition. For example, all forests share certain properties regarding nutrient cycling, disturbance and biomass that are different from the properties of grasslands.

**Biosphere**

The part of the Earth and its atmosphere in which living organisms exist or that is capable of supporting life.

**Black carbon**

Operationally defined aerosol based on measurement of light absorption and chemical reactivity and/or thermal stability. Black carbon is formed through the incomplete combustion of fossil fuels, biofuel and biomass, and is emitted as part of anthropogenic and naturally occurring soot. It consists of pure carbon in several linked forms. Black carbon warms the Earth by absorbing sunlight and re-emitting heat to the atmosphere and by reducing albedo (the ability to reflect sunlight) when deposited on snow and ice.

**Bleaching (of coral reefs)**

A phenomenon occurring when corals under stress expel their mutualistic microscopic algae, called zooxanthellae. This results in a severe decrease or even total loss of photosynthetic pigments. Since most reef-building corals have white calcium carbonate skeletons, these then show through the corals' tissue and the coral reef appears bleached.

**Blue water**

Fresh surface and groundwater, in other words, the water in freshwater lakes, rivers and aquifers. The blue water footprint is the volume of surface and groundwater consumed as a result of the production of a good or service. Blue water consumption refers to the volume of freshwater used and then evaporated or incorporated into a product. It also includes water abstracted from surface or groundwater in a catchment and returned to another catchment or the sea. It is the amount of water abstracted from groundwater or surface water that does not return to the catchment from which it was withdrawn.

**Bottom-up**

From the lowest level of a hierarchy or process to the top.

**By-catch**

The unwanted fish and other marine creatures caught during commercial fishing for a different species.

**Cadastre**

A register of property showing the extent, value, and ownership of land for taxation.

**Capacity development**

The process through which individuals, organizations and societies obtain, strengthen and maintain the capabilities to set and achieve their own development objectives over time.

**Cap and trade (system)**

A regulatory or management system that sets a target level for emissions or natural resource use, and, after distributing shares in that quota, lets trading in those permits determine their price.



### **Capital**

Resource that can be mobilized in the pursuit of an individual's goals. Thus, natural capital (natural resources such as land and water), physical capital (technology and artefacts), social capital (social relationships, networks and ties), financial capital (money in a bank, loans and credit), human capital (education and skills).

### **Carbon dioxide equivalent (CO<sub>2</sub>-equivalent or CO<sub>2</sub>e)**

The universal unit of measurement used to indicate the global warming potential of the different greenhouse gases. Carbon dioxide – a naturally occurring gas that is a byproduct of burning fossil fuels and biomass, land-use changes and other industrial processes – is the reference against which other greenhouse gases are measured.

### **Carbon fertilization**

The CO<sub>2</sub> fertilization effect begins with enhanced photosynthetic CO<sub>2</sub> fixation. Non-structural carbohydrates tend to accumulate in leaves and other plant organs as starch, soluble carbohydrates or polyfructosans, depending on species. In some cases, there may be feedback inhibition of photosynthesis associated with accumulation of non-structural carbohydrates. Increased carbohydrate accumulation, especially in leaves, may be evidence that crop plants grown under CO<sub>2</sub> enrichment may not be fully adapted to take complete advantage of elevated CO<sub>2</sub>. This may be because the CO<sub>2</sub>-enriched plants do not have an adequate sink (inadequate growth capacity), or lack capacity to load phloem and translocate soluble carbohydrates. Improvement of photoassimilate utilization should be one goal of designing cultivars for the future.

### **Carbon sequestration**

The process of increasing the carbon content of a reservoir other than the atmosphere.

### **Carbon stock**

The quantity of carbon contained in a "pool," meaning a reservoir or system which has the capacity to accumulate or release carbon.

### **Cataracts**

A cloudiness or opacity in the normally transparent crystalline lens of the eye. This cloudiness can cause a decrease in vision and may lead to eventual blindness.

### **Catchment (area)**

The area of land from which precipitation drains into a river, basin or reservoir. See also Drainage basin.

### **Chikungunya**

Chikungunya is a viral disease transmitted to humans by infected mosquitoes. It causes fever and severe joint pain. Other symptoms include muscle pain, headache, nausea, fatigue and rash.

### **Circular economy**

A circular economy is a systems approach to industrial processes and economic activity that enables resources used to maintain their highest value for as long as possible.

Key considerations in implementing a circular economy are reducing and rethinking research use, and the pursuit of longevity, renewability, reusability, reparability, replaceability, upgradability for resources and products that are used.

### **Citizen science**

The collection and analysis of data relating to the natural world by members of the general public, typically as part of a collaborative project with professional scientists.

### **Citizen scientist**

A member of the general public who collects and analyses data relating to the natural world, typically as part of a collaborative project with professional scientists.

### **Civil society**

The aggregate of non-governmental organizations and institutions representing the interests and will of citizens.

### **Clean Development Mechanism (CDM)**

The mechanism provided by Article 12 of the Kyoto Protocol, designed to assist developing countries achieve sustainable development by permitting industrialized countries to finance projects for reducing greenhouse gas emissions in developing countries and receive carbon credits for doing so.

### **Climate change**

The UN Framework Convention on Climate Change defines climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods."

### **Climate proofing**

A shorthand term for identifying risks to a development project, or any other specified natural or human asset, as a consequence of climate variability and change, and ensuring that those risks are reduced to acceptable levels through long-lasting and environmentally sound, economically viable, and socially acceptable changes implemented at one or more of the following stages in the project cycle: planning, design, construction, operation and decommissioning.

### **Climate variability**

Variations in the mean state and other statistics (such as standard deviations and the occurrence of extremes) of the climate on all temporal and spatial scales beyond that of individual weather events. Variability may be due to natural internal processes in the climate system (internal variability), or to variations in natural or anthropogenic external forcing (external variability).

### **Chlorofluorocarbons (CFCs)**

A group of chemicals, consisting of chlorine, fluorine and carbon, highly volatile and of low toxicity, widely used in the past as refrigerants, solvents, propellants and foaming agents. Chlorofluorocarbons have both ozone depletion and global warming potential.

**Community-based monitoring and information systems (CBMIS)**

This term refers to initiatives by indigenous peoples and local community organisations to monitor their community's well-being and the state of their territories and natural resources, applying a mix of traditional knowledge and innovative tools and approaches.

**Cross-cutting issue**

An issue that cannot be adequately understood or explained without reference to the interactions of several of its dimensions that are usually defined separately.

**Crowdsourcing**

A problem-solving and production process that involves outsourcing tasks to a network of people, also known as the crowd. This process can occur both online and offline.

**Conjunctival melanoma**

A pigmented lesion of the ocular surface. It is an uncommon but potentially devastating tumor that may invade the local tissues of the eye, spread systemically through lymphatic drainage and hematogenous spread, and recur in spite of treatment.

**Conservation**

The protection, care, management and maintenance of ecosystems, habitats, wildlife species and populations, within or outside of their natural environments, in order to safeguard the natural conditions for their long-term permanence.

**Crop**

(The total amount collected of) a plant such as a grain, fruit or vegetable grown in large amounts.

**Cultural services**

In the context of ecosystems, the non-material benefits for people, including spiritual enrichment, cognitive development, recreation and aesthetic experience.

**Custodian agencies**

United Nations bodies (and in some cases, other international organizations) responsible for compiling and verifying country data and metadata, and for submitting the data, along with regional and global aggregates, to the United Nations Statistics Division (UNSD). Furthermore, custodian agencies are expected to take the lead in developing missing indicators.

**Cutaneous malignant melanoma**

The most common subtype of malignant melanoma, a malignant neoplasm that arises from melanocytes. Melanocytes predominantly occur in the basal layer of the epidermis but do occur elsewhere in the body. Primary cutaneous melanoma is by far the most common type of primary melanoma, although it may occur in other tissues, e.g. primary uveal malignant melanoma.

**Dataset**

A collection of data on a particular issue.

**DDT (dichlorodiphenyltrichloroethane)**

A synthetic organochlorine insecticide, one of the persistent organic pollutants listed for control under the Stockholm Convention on Persistent Organic Pollutants.

**Decarbonization**

Remove carbon or carbonaceous deposits from (an engine or other metal object).

**Deforestation**

Conversion of forested land to non-forest areas.

**Dengue**

An infectious diseases caused by any one of four related viruses transmitted by mosquitoes. The dengue virus is a leading cause of illness and death in the tropic and subtropics. As many as 400 million people are infected yearly.

**Desertification**

Land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities. It involves crossing thresholds beyond which the underpinning ecosystem cannot restore itself, but requires ever-greater external resources for recovery.

**Detoxification**

The process of removing toxic substances or qualities.

**Disability-adjusted life years (DALYS)**

The sum of years of potential life lost due to premature mortality and the years of productive life lost due to disability.

**Disaggregation**

To separate into component parts.

**Disaster risk management**

The application of disaster risk reduction policies and strategies, to prevent new disaster risks, reduce existing disaster risks, and manage residual risks, contributing to the strengthening of resilience and reduction of losses. Disaster risk management actions can be categorized into; prospective disaster risk management, corrective disaster risk management and compensatory disaster risk management (also referred to as residual risk management).

**Disaster risk reduction**

The conceptual framework of elements intended to minimize vulnerability to disasters throughout a society, to avoid (prevention) or limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development.

**DPSIR Framework**

UNEP adopted the DPSIR causal framework approach for the GEO assessments. This represents a systems-analysis view in which the driving forces of social and economic development exert pressures on the environment, which change the state of the environment. The changing state of the environment leads to impacts on, for example, human well-being and ecosystem health, which then produces human responses to remedy these impacts, such as social controls, redirecting investments, and/or policies and political interventions to influence human activity. Finally, these responses influence the state of the environment, either directly or indirectly, through the driving forces or the pressures. Existing policies increasingly need to be assessed in terms of how they address the drivers and impacts of environmental challenges.





### **Drainage basin**

(Also called watershed, river basin or catchment)  
Land area where precipitation runs off into streams, rivers, lakes and reservoirs. It is a land feature that can be identified by tracing a line along the highest elevations between different areas, often a ridge.

### **Drip irrigation**

Sometimes called trickle irrigation and involves dripping water onto the soil at very low rates (2-20 litres/hour) from a system of small diameter plastic pipes fitted with outlets called emitters or drippers. Water is applied close to plants so that only part of the soil in which the roots grow is wetted (Figure 60), unlike surface and sprinkler irrigation, which involves wetting the whole soil profile. With drip irrigation water, applications are more frequent (usually every 1-3 days) than with other methods and this provides a very favourable high moisture level in the soil in which plants can flourish.

### **Driver**

The overarching socio-economic forces that exert pressures on the state of the environment.

### **Drylands**

Areas characterized by lack of water, which constrain two major, linked ecosystem services: primary production and nutrient cycling. Four dryland sub-types are widely recognized: dry sub-humid, semi-arid, arid and hyper-arid, showing an increasing level of aridity or moisture deficit.

### **E-waste (electronic waste)**

A generic term encompassing various forms of electrical and electronic equipment that has ceased to be considered of value and is disposed of.

### **Early warning**

The provision of timely and effective information, through identified institutions, that allows individuals exposed to a hazard to take action to avoid or reduce their risk and prepare an effective response.

### **Earth System**

The Earth System is a complex social-environmental system of interacting physical, chemical, biological and social components and processes that determine the state and evolution of the planet and life on it.

### **Eco-design**

The integration of environmental aspects into product design and development with the aim of reducing adverse environmental impacts throughout a product's life cycle.

### **Ecological footprint**

A measure of the area of biologically productive land and water an individual, population or activity uses to produce all the resources it consumes and to absorb the corresponding waste (such as carbon dioxide emissions from fossil fuel use), using prevailing technology and resource management practices. The ecological footprint is usually measured in global hectares.

### **Ecoregion**

A major ecosystem defined by distinctive geography and receiving uniform solar radiation and moisture.

### **Ecosystem**

A dynamic complex of plant, animal and micro-organism communities and their non-living environment, interacting as a functional unit.

### **Ecosystem approach**

A strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. An ecosystem approach is based on the application of appropriate scientific methods, focused on levels of biological organization that encompass the essential structure, processes, functions and interactions among and between organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of many ecosystems.

### **Ecosystem boundaries**

Ecosystem boundaries are zones of transitions between two adjacent habitats. They occur naturally in all biomes but the extent of boundaries has been greatly increased by anthropogenic habitat modification. Transition zones are characterized by a profound change in the composition of plant and animal communities and that transition may be abrupt, gradual or even occur via a series of intermediate habitat types.

### **Ecosystem collapse**

The endpoint of ecosystem decline, and occurs when all occurrences of an ecosystem have moved outside the natural range of spatial and temporal variability in composition, structure and/or function.

### **Ecosystem function**

An intrinsic ecosystem characteristic related to the set of conditions and processes whereby an ecosystem maintains its integrity (such as primary productivity, food chain and biogeochemical cycles). Ecosystem functions include such processes as decomposition, production, nutrient cycling, and movements of nutrients and energy.

### **Ecosystem health**

The degree to which ecological factors and their interactions are reasonably complete and function for continued resilience, productivity and renewal of the ecosystem.

### **Ecosystem management**

An approach to maintaining or restoring the composition, structure, function and delivery of services of natural and modified ecosystems for the goal of achieving sustainability. It is based on an adaptive, collaboratively developed vision of desired future conditions that integrates ecological, socio-economic, and institutional perspectives, applied within a geographic framework, and defined primarily by natural ecological boundaries.

### **Ecosystem resilience**

The level of disturbance that an ecosystem can withstand without crossing a threshold to become a different structure or deliver different outputs. Resilience depends on ecological dynamics as well as human organizational and institutional capacity to understand, manage and respond to these dynamics.

**Ecosystem restoration**

The process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed.

**Ecosystem-based adaptation**

The use of biodiversity and ecosystem services as part of an overall strategy to help people adapt to the adverse effects of climate change.

**Ecotourism**

Travel undertaken to witness the natural or ecological quality of particular sites or regions, including the provision of eco-friendly services to facilitate such travel.

**Effluent**

In issues of water quality, refers to liquid waste (treated or untreated) discharged to the environment from sources such as industrial process and sewage treatment plants.

**El Niño (also El Niño-Southern Oscillation (ENSO))**

In its original sense, it is a warm water current that periodically flows along the coast of Ecuador and Peru, disrupting the local fishery. This oceanic event is associated with a fluctuation of the inter-tropical surface pressure pattern and circulation in the Indian and Pacific Oceans, called the Southern Oscillation. This atmosphere-ocean phenomenon is collectively known as El Niño-Southern Oscillation. During an El Niño event, the prevailing trade winds weaken and the equatorial countercurrent strengthens, causing warm surface waters in the Indonesian area to flow eastward to overlie the cold waters of the Peru current off South America. This event has great impact on the wind, sea surface temperature and precipitation patterns in the tropical Pacific. It has climatic effects throughout the Pacific region and in many other parts of the world. The opposite of an El Niño event is called La Niña.

**Electrification**

The action or process of charging something with electricity.

**Emission inventory**

Details the amounts and types of pollutants released into the environment.

**Endangered species**

A species is endangered when the best available evidence indicates that it meets any of the criteria A to E specified for the endangered category of the IUCN Red List, and is therefore considered to be facing a very high risk of extinction in the wild.

**Endocrine disruptor**

An external substance that interferes (through mimicking, blocking, inhibiting or stimulating) with function(s) of the hormonal system and consequently causes adverse health effects in an intact organism, or its progeny, or (sub) populations.

**Energy intensity**

Ratio of energy consumption to economic or physical output. At the national level, energy intensity is the ratio of total domestic primary energy consumption or final energy

consumption to gross domestic product or physical output. Lower energy intensity shows greater efficiency in energy use.

**Environment statistics**

Statistics that describe the state of and trends in the environment, covering the media of the natural environment (air/ climate, water, land/soil), the living organisms within the media, and human settlements.

**Environmental assessment**

The entire process of undertaking an objective evaluation and analysis of information designed to support environmental decision making. It applies the judgement of experts to existing knowledge to provide scientifically credible answers to policy-relevant questions, quantifying where possible the level of confidence. It reduces complexity but adds value by summarizing, synthesizing and building scenarios, and identifies consensus by sorting out what is known and widely accepted from what is not known or not agreed. It sensitizes the scientific community to policy needs and the policy community to the scientific basis for action.

**Environmental degradation**

Environmental degradation is the deterioration in environmental quality from ambient concentrations of pollutants and other activities and processes such as improper land use and natural disasters.

**Environmental education**

The process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness of humans, their culture and biophysical surroundings. Environmental education also entails practice in decision-making and self-formulation of a code of behaviour about issues concerning environmental quality.

**Environmental flows**

Quantity, timing and quality of water flows required to sustain freshwater and estuarine ecosystems and the human livelihoods and well-being that depend on these ecosystems. Through implementation of environmental flows, water managers strive to achieve a flow regime, or pattern, that provides for human uses and maintains the essential processes required to support healthy river ecosystems.

**Environmental footprint**

The effect that a person, company, activity, etc. has on the environment, for example the amount of natural resources that they use and the amount of harmful gases that they produce.

**Environmental governance**

Environmental Governance is the means by which society determines and acts on goals and priorities related to the management of natural resources. This includes the rules, both formal and informal, that govern human behavior in decision-making processes as well as the decisions themselves. Appropriate legal frameworks on the global, regional, national and local level are a prerequisite for good environmental governance.



### **Environmental health**

Those aspects of human health and disease that are determined by factors in the environment. It also refers to the theory and practice of assessing and controlling factors in the environment that can potentially affect health. Environmental health includes both the direct pathological effects of chemicals, radiation and some biological agents, and the effects, often indirect, on health and well-being of the broad physical, psychological, social and aesthetic environment. This includes housing, urban development, land use and transport.

### **Environmental impact assessment (EIA)**

An analytical process or procedure that systematically examines the possible environmental consequences of a given activity or project. The aim is to ensure that the environmental implications are taken into account before the decisions are made.

### **Environmental justice**

A mechanism of accountability for the protection of rights and the prevention and punishment of wrongs related to the disproportionate impacts of growth on the poor and vulnerable in society from rising pollution and degradation of ecosystem services, and from inequitable access to and benefits from the use of natural assets and extractive resources.

### **Environmental monitoring**

Regular, comparable measurements or time series of data on the environment.

### **Environmental policy**

A policy aimed at addressing environmental problems and challenges.

### **Environmental pressure**

Pressure resulting from human activities which bring about changes in the state of the environment.

### **Environmental refugees and internally displaced people (IDPs)**

People who have been forced to leave their traditional habitat temporarily or permanently, because of a marked environmental disruption (natural or triggered by people) that jeopardizes their existence and/or seriously affected the quality of their life. (Science for Peace) belong to a larger group of immigrants known as environmental refugees. Environmental refugees include immigrants forced to flee because of natural disasters, such as volcanoes and tsunamis.

### **Epidemiology**

The branch of medicine which deals with the incidence, distribution, and possible control of diseases and other factors relating to health.

### **Equity**

Fairness of rights, distribution and access. Depending on context, this can refer to access to resources, services or power.

### **Estuary**

Water passage where the tide meets a river current.

### **Eutrophication**

The degradation of water or land quality due to enrichment by nutrients, primarily nitrogen and phosphorous, which results in excessive plant (principally algae) growth and decay. Eutrophication of a lake normally contributes to its slow evolution into a bog or marsh and ultimately to dry land. Eutrophication may be accelerated by human activities that speed up the ageing process.

### **Evapotranspiration**

Combined loss of water by evaporation from the soil or surface water, and transpiration from plants and animals.

### **External cost (also externality)**

A cost that is not included in the market price of the goods and services produced. In other words, a cost not borne by those who create it, such as the cost of cleaning up contamination caused by discharge of pollution into the environment.

### **Feed-in tariff**

A feed-in tariff is an energy policy focused on supporting the development and dissemination of renewable power generation. In a feed-in tariff scheme, providers of energy from renewable sources, such as solar, wind or water, receive a price for what they produce based on the generation costs. This purchase guarantee is offered generally on a long-term basis, ranging from 5 to 20 years, but most commonly spanning 15–20 years.<sup>1</sup> The cost of the tariff payments are typically shared with the electricity consumers.

### **Feedback**

Where non-linear change is driven by reactions that either dampen change (negative feedbacks) or reinforce change (positive feedbacks).

### **Fipronil systemic insecticides**

Phenyl-pyrazole fipronil are insecticides with systemic properties. Their physicochemical characteristics, mainly assessed in terms of their octanol water partition coefficient (*K<sub>ow</sub>*) and dissociation constant (*pK<sub>a</sub>*), enable their entrance into plant tissues and their translocation to all its parts. Regardless of the manner of application and route of entry to the plant, they translocate throughout all plant tissues making them toxic to any insects (and potentially other organisms) that feed upon the plant. This protects the plant from direct damage by herbivorous (mainly sap feeding) insects and indirectly from damage by plant viruses that are transmitted by insects.

### **Floods (river, flash and storm surge)**

Usually classified into three types: river flood, flash flood and storm surge. River floods result from intense and/or persistent rain over large areas. Flash floods are mostly local events resulting from intense rainfall over a small area in a short period of time. Storm surge floods occur when flood water from the ocean or large lakes is pushed on to land by winds or storms.

### **Food security**

Physical and economic access to food that meets people's dietary needs as well as their food preferences.



### Food system

1) Food systems are usually conceived as a set of activities ranging from production to consumption. It is a broad concept encompassing food security and its components – availability, access and utilization – and including the social and environmental outcomes of these activities. Food systems in developing countries have been largely transformed by globalization. This change offers tremendous opportunities for food workers to access new and better employments. Yet, small scale food producers and other food workers are still too often excluded from the benefits generated by food businesses.

### Food-water-energy nexus

The water-food-energy nexus is central to sustainable development. Demand for all three is increasing, driven by a rising global population, rapid urbanization, changing diets and economic growth. Agriculture is the largest consumer of the world's freshwater resources, and more than one-quarter of the energy used globally is expended on food production and supply. The inextricable linkages between these critical domains require a suitably integrated approach to ensuring water and food security, and sustainable agriculture and energy production worldwide.

### Forest

Land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of more than 10 per cent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban use.

### Forest degradation

Changes within the forest that negatively affect the structure or function of the stand or site, and thereby lower the capacity to supply products and/or services.

### Forest management

The processes of planning and implementing practices for the stewardship and use of forests and other wooded land aimed at achieving specific environmental, economic, social and/or cultural objectives.

### Forest plantation

Forest stands established by planting and/or seeding in the process of afforestation or reforestation. They are either of introduced species (all planted stands), or intensively managed stands of indigenous species, which meet all the following criteria: contain one or two species, are of similar age and regularly spaced. "Planted forest" is another term used for plantation.

### Fossil fuel

Coal, natural gas and petroleum products (such as oil) formed from the decayed bodies of animals and plants that died millions of years ago.

### Free-riding

Free riding occurs when one firm (or individual) benefits from the actions and efforts of another without paying or sharing the costs. For example, a retail store may initially choose to incur costs of training its staff to demonstrate to potential

customers how a particular kitchen appliance works. It may do so in order to expand its sales. However, the customers may later choose to buy the product from another retailer selling at a lower price because its business strategy is not to incur these training and demonstration costs. This second retailer is viewed as "free riding" on the efforts and the costs incurred by the first retailer. If such a situation persists, the first retailer will not have the incentive to continue.

### Gender

Gender refers to the roles, behaviors, activities, and attributes that a given society at a given time considers appropriate for men and women. In addition to the social attributes and opportunities associated with being male and female and the relationships between women and men and girls and boys, gender also refers to the relations between women and those between men. These attributes, opportunities and relationships are socially constructed and are learned through socialization processes. They are context/ time-specific and changeable. Gender determines what is expected, allowed and valued in a woman or a man in a given context. Gender is part of the broader socio-cultural context, as are other important criteria for socio-cultural analysis including class, race, poverty level, ethnic group, sexual orientation, age, etc.

### Gender analysis

Gender analysis is a critical examination of how differences in gender roles, activities, needs, opportunities and rights/ entitlements affect men, women, girls and boys in certain situation or contexts. Gender analysis examines the relationships between females and males and their access to and control of resources and the constraints they face relative to each other. A gender analysis should be integrated into all sector assessments or situational analyses to ensure that gender-based injustices and inequalities are not exacerbated by interventions, and that where possible, greater equality and justice in gender relations are promoted.

### Gender equality (Equality between women and men)

This refers to the equal rights, responsibilities and opportunities of women and men and girls and boys. Equality does not mean that women and men will become the same but that women's and men's rights, responsibilities and opportunities will not depend on whether they are born male or female. Gender equality implies that the interests, needs and priorities of both women and men are taken into consideration, recognizing the diversity of different groups of women and men. Gender equality is not a women's issue but should concern and fully engage men as well as women. Equality between women and men is seen both as a human rights issue and as a precondition for, and indicator of, sustainable people-centered development.

### Gender gap

The term gender gap refers to any disparity between women and men's condition or position in society. It is often used to refer to a difference in average earnings between women and men, e.g. "gender pay gap." However, gender gaps can be found in many areas, such as economic participation and opportunity, educational attainment, health and survival and political empowerment.



### **Gender mainstreaming**

Gender mainstreaming is the chosen strategy of the United Nations system for implementing greater equality for women and girls in relation to men and boys. Mainstreaming a gender perspective is the process of assessing the implications for women and men of any planned action, including legislation, policies or programs, in all areas and at all levels. It is a way to make women's as well as men's concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies and programs in all political, economic and societal spheres so that women and men benefit equally and inequality is not perpetuated. The ultimate goal is to achieve gender equality.

### **Gender-disaggregated data**

Information collected and presented separately according to people's gender. It typically includes the state of being masculine or feminine based on social or cultural identities, constructs and differences.

### **Genetic diversity**

The variety of genes within a particular species, variety or breed.

### **GEO Data Portal (now Environmental Data Explorer)**

The source for datasets used by UNEP and its partners in the Global Environment Outlook report and other integrated environmental assessments. Its online database holds more than 500 different variables, including national, sub-regional, regional and global statistics as well as geospatial datasets (maps), covering themes such as freshwater, population, forests, emissions, climate, disasters, health and GDP.

### **Geomorphology**

The study of the physical features of the surface of the earth and their relation to its geological structures.

### **Geospatial**

Relating to or denoting data that is associated with a particular location.

### **Geostationary orbit**

Circular orbit 35,785 km (22,236 miles) above Earth's Equator in which a satellite's orbital period is equal to Earth's rotation period of 23 hours and 56 minutes. A spacecraft in this orbit appears to an observer on Earth to be stationary in the sky. This particular orbit is used for meteorological and communications satellites. The geostationary orbit is a special case of the geosynchronous orbit, which is any orbit with a period equal to Earth's rotation period.

### **Geothermal energy**

The word geothermal comes from the Greek words geo (earth) and therme (heat). Geothermal energy is heat within the earth. People can use this heat as steam or as hot water to heat buildings or to generate electricity. Geothermal energy is a renewable energy source because heat is continuously produced inside the earth.

### **Glacial periods**

A period in the earth's history when polar and mountain ice sheets were unusually extensive across the earth's surface.

### **Glacier retreat**

Glaciers retreat when their terminus does not extend as far downvalley as it previously did. Glaciers may retreat when their ice melts or ablates more quickly than snowfall can accumulate and form new glacial ice. Higher temperatures and less snowfall have been causing many glaciers around the world to retreat recently.

### **Global (international) environmental governance**

The assemblage of laws and institutions that regulate society-nature interactions and shape environmental outcomes.

### **Global commons**

Natural un-owned assets such as the atmosphere, oceans, outer space and the Antarctic.

### **Global Earth Observation System of Systems (GEOSS)**

A network aiming to link existing and planned Earth observing systems (e.g., satellites and networks of weather stations and ocean buoys) around the world, support the development of new systems where gaps currently exist, and promote common technical standards so that data from the thousands of different instruments can be combined into coherent datasets. It aims to provide decision support tools to policy makers and other users in areas such as health, agriculture and disasters.

### **Global hectare**

A hypothetical hectare with world-average ability to produce resources and absorb wastes.

### **Global observation system**

A set of coordinated monitoring activities that would collect much needed data at a global scale on a variety of indicators such as biodiversity, water quality and quantity, atmospheric pollution, land degradation and chemical release.

### **Global public good**

Public goods that have universal benefits, covering multiple groups of countries and all populations.

### **Global warming**

Increase in surface air temperature, referred to as the global temperature, induced by emissions of greenhouse gases into the air.

### **Globalization**

The increasing integration of economies and societies around the world, particularly through trade and financial flows, and the transfer of culture and technology.

### **Governance**

The act, process, or power of governing for the organization of society/ies. For example, there is governance through the state, the market, or through civil society groups and local organizations. Governance is exercised through institutions: laws, property-rights systems and forms of social organization.

### **Green economy**

There is no internationally agreed definition of green economy and at least eight separate definitions were identified in recent publications. For example, UNEP has defined the green economy as "one that results in improved human well-being and social equity, while significantly reducing environmental



risks and ecological scarcities. It is low carbon, resource efficient, and socially inclusive” (UNEP, 2011). This definition has been cited in a number of more recent reports, including by the UNEMG and the OECD. Another definition for green economy offered by the Green Economy Coalition (a group of NGOs, trade union groups and others doing grassroots work on a green economy) succinctly defines green economy as “a resilient economy that provides a better quality of life for all within the ecological limits of the planet.”

### **Greenhouse gases (GHGs)**

Gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit thermal radiation. This property causes the greenhouse effect. Water vapour (H<sub>2</sub>O), carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>) and ozone (O<sub>3</sub>) are the primary greenhouse gases in the Earth’s atmosphere. There are human-made greenhouse gases in the atmosphere, such as halocarbons and other chlorine- and bromine-containing substances. Beside CO<sub>2</sub>, N<sub>2</sub>O and CH<sub>4</sub>, the Kyoto Protocol deals with sulphur hexafluoride (SF<sub>6</sub>), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and nitrogen trifluoride (NF<sub>3</sub>).

### **Grey water**

Water the quality of which has been adversely affected by human use, in industrial, agriculture or domestically. The grey water footprint of a product is an indicator of freshwater pollution that can be associated with the production of a product over its full supply chain. It is defined as the volume of freshwater that is required to assimilate the load of pollutants based on natural background concentrations and existing ambient water quality standards. It is calculated as the volume of water that is required to dilute pollutants to such an extent that the quality of the water remains above agreed water quality standards.

### **Gross domestic product (GDP)**

The value of all final goods and services produced in a country in one year. GDP can be measured by adding up all of an economy’s incomes – wages, interest, profits, and rents – or expenditures – consumption, investment, government purchases, and net exports (exports minus imports).

### **Ground truthing**

A process by which the content of satellite images, aerial photographs – or maps based on them – is compared with the reality on the ground through site visits and field surveys. It is used to verify the accuracy of the images or the way they have been interpreted to produce maps.

### **Groundwater**

Water that flows or seeps downward and saturates soil or rock, supplying springs and wells. The upper surface of the saturated zone is called the water table.

### **Gyres**

A large system of rotating ocean currents, primarily driven by wind movement. Large gyres exist in the Indian Ocean, North Atlantic, North Pacific, South Atlantic and South Pacific.

### **Habitat fragmentation**

Alteration of habitat resulting in spatial separation of habitat units from a previous state of greater continuity.

### **Habitat**

(1) The place or type of site where an organism or population occurs naturally.

(2) Terrestrial or aquatic areas distinguished by geographic, living and non-living features, whether entirely natural or semi-natural.

### **Hadley cell**

A large-scale atmospheric convection cell in which air rises at the equator and sinks at medium latitudes, typically about 30° north or south.

### **Hazard**

A potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

### **Hazardous waste**

A used or discarded material that can damage human health and the environment. Hazardous wastes may include heavy metals, toxic chemicals, medical wastes or radioactive material.

### **Heavy metals**

A subset of elements that exhibit metallic properties, including transitional metals and semi-metals (metalloids), such as arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc, that have been associated with contamination and potential toxicity.

### **Helminth**

Worm-like parasites.

### **Heterogeneities**

The quality or state of being diverse in character or content.

### **High seas**

The oceans outside national jurisdictions, lying beyond each nation’s exclusive economic zone or other territorial waters.

### **Human footprint**

The impact of human activities measured in terms of the area of biologically productive land and water required to produce the goods consumed and to assimilate the wastes generated.

### **Human health**

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

### **Human well-being**

The extent to which individuals have the ability to live the kinds of lives they have reason to value; the opportunities people have to pursue their aspirations. Basic components of human well-being include: security, meeting material needs, health and social relations.

### **Hybridization**

The process of an animal or plant breeding with an individual of another species or variety.



### **Hydraulic fracturing**

The gas-fired plants come courtesy of the revolution in hydraulic fracturing ("fracking"), which has delivered a vast supply of low-cost natural gas to an electricity market that has struggled with steadily rising coal prices since 2001.

### **Hydrochlorofluorocarbons (HCFCs)**

Organic and human-made substances composed of hydrogen, chlorine, fluorine and carbon atoms. As the ozone-depleting potential of HCFCs is much lower than that of CFCs, HCFCs were considered acceptable interim substitutes for CFCs.

### **Hydrological cycle**

Succession of stages undergone by water in its passage from the atmosphere to the Earth's surface and its return to the atmosphere. The stages include evaporation from land, sea or inland water, condensation to form clouds, precipitation, accumulation in the soil or in water bodies, and re-evaporation.

### **Hydrometeorology**

A branch of meteorology that deals with water in the atmosphere especially as precipitation.

### **Hydroponics**

The process of growing plants in sand, gravel, or liquid, with added nutrients but without soil.

### **Hypoxia**

Lack of oxygen. In the context of eutrophication and algal blooms, hypoxia is the result of a process that uses up dissolved oxygen in the water. Algal blooms cause water to become more opaque, thereby reducing light availability to submerged aquatic vegetation, and interfering with beneficial human water uses. When the bloom dies off, algae sink to the bottom and are decomposed by bacteria using up the available oxygen. Hypoxia is particularly severe in the late summer, and can be so severe in some areas that they are referred to as "dead zones" because only bacteria can survive there.

### **IAS Invasive alien species**

Invasive alien species are plants, animals, pathogens and other organisms that are non-native to an ecosystem, and which may cause economic or environmental harm or adversely affect human health. In particular, they impact adversely upon biodiversity, including decline or elimination of native species - through competition, predation, or transmission of pathogens - and the disruption of local ecosystems and ecosystem functions.

### **Improved drinking water**

"Improved" sources of drinking water include piped water into dwellings; piped water into yards/plots; public taps or standpipes; tube wells or boreholes; protected dug wells; protected springs; and rainwater.

### **Improved sanitation**

"Improved" sanitation includes flush lavatories; piped sewer systems; septic tanks; flush/pour flush to pit latrines; ventilated improved pit latrines (VIP); pit latrines with slab; composting lavatories.

### **In vitro**

(Of a process) performed or taking place in a test tube, culture dish, or elsewhere outside a living organism.

### **Inertial forces**

Any force invoked by an observer to maintain the validity of Isaac Newton's second law of motion in a reference frame that is rotating or otherwise accelerating at a constant rate. For specific inertial forces, see centrifugal force; Coriolis force; d'Alembert's principle.

### **Institutions**

Regularized patterns of interaction by which society organizes itself: the rules, practices and conventions that structure human interaction. The term is wide and encompassing, and could be taken to include law, social relationships, property rights and tenurial systems, norms, beliefs, customs and codes of conduct as much as multilateral environmental agreements, international conventions and financing mechanisms. Institutions could be formal (explicit, written, often having the sanction of the state) or informal (unwritten, implied, tacit, mutually agreed and accepted).

### **Integrated coastal zone management**

Approaches that integrate economic, social and ecological perspectives for the management of coastal resources and areas.

### **Integrated water resources management (IWRM)**

A process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

### **Intersectionality**

The understanding that social roles and identities overlap and have intertwined effects. The identity of any individual reflects and is shaped by a range of social and cultural categories such as race, class, gender, sexual orientation, and religion (among others). Oppressions within society are enacted through these multiple and linked identities.

### **Invasive species**

Introduced species that have spread beyond their area of introduction (and, rarely, native species that have recently expanded their populations), and which are frequently associated with negative impacts on the environment, human economy or human health.

### **Jetstream**

A narrow variable band of very strong predominantly westerly air currents encircling the globe several miles above the earth. There are typically two or three jet streams in each of the northern and southern hemispheres.

### **Keratinocyte**

Cells found in the epidermis. Keratinocytes at the outer surface of the epidermis are dead and form a tough protective layer. The cells underneath divide to replenish the supply.

### **Kyoto Protocol**

A protocol to the 1992 United Nations Framework Convention on Climate Change (UNFCCC) adopted at the Third Session of the Conference of the Parties to the UNFCCC in 1997 in Kyoto, Japan. It contains legally binding commitments in addition to those included in the UNFCCC. Countries included in Annex B of the protocol (most OECD countries and countries



with economies in transition) agreed to control their national anthropogenic emissions of greenhouse gases (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, SF<sub>6</sub> and NF<sub>3</sub>) so that the total emissions from these countries would be at least 5 per cent below 1990 levels in the commitment period, 2008 to 2012.

#### **Land cover**

The physical coverage of land, usually expressed in terms of vegetation cover or lack of it. Influenced by but not synonymous with land use.

#### **Land degradation neutrality**

A state whereby the amount and quality of land resources, necessary to support ecosystem functions and services and enhance food security, remains stable or increases within specified temporal and spatial scales and ecosystems.

#### **Land degradation neutrality**

A state whereby the amount and quality of land resources, necessary to support ecosystem functions and services and enhance food security, remains stable or increases within specified temporal and spatial scales and ecosystems.

#### **Land degradation**

A long-term loss of ecosystem function and services, caused by disturbances from which the system cannot recover unaided.

#### **Land grabbing**

Large-scale land grabbing is defined as “acquisitions or concessions that are one or more of the following: (i) in violation of human rights, particularly the equal rights of women; (ii) not based on free, prior and informed consent of affected land-users; (iii) not based on a thorough assessment, or in disregard of social, economic and environmental impacts including the way those impacts are gendered; (iv) not based on transparent contracts that specify clear and binding commitments about activities, employment and benefits sharing; and (v) not based on effective democratic planning, independent oversight and meaningful participation.”

#### **Land Tenure**

The relationship, whether legally or customarily defined, among people, as individuals or groups, with respect to land. (For convenience, “land” is used here to include other natural resources such as water and trees.) Land tenure is an institution, i.e., rules invented by societies to regulate behaviour. Rules of tenure define how property rights to land are to be allocated within societies. They define how access is granted to rights to use, control, and transfer land, as well as associated responsibilities and restraints. In simple terms, land tenure systems determine who can use what resources for how long, and under what conditions.

#### **Land use planning**

The systematic assessment of land and water potential, alternative patterns of land use and other physical, social and economic conditions, for the purpose of selecting and adopting land-use options which are most beneficial to land users.

#### **Land use**

The functional dimension of land for different human purposes or economic activities. Examples of land use categories include agriculture, industrial use, transport and protected areas.

#### **Land-use planning**

Land-use planning involves the systematic assessment of environmental, economic and social impacts of the range of potential uses of land in order to decide on the optimal pattern of land use. Land-use planning and systematic conservation planning has seldom been explored explicitly as a tool in global scenarios.

#### **Legitimacy**

Measure of political acceptability or perceived fairness. State law has its legitimacy in the state; local law and practices work on a system of social sanction, in that they derive their legitimacy from a system of social organization and relationships.

#### **Leverage point**

A place in a system’s structure where a relatively small amount of force can effect change. It is a low leverage point if a small amount of force causes a small change in system behaviour, or a high leverage point if a small amount of force causes a large change.

#### **Life-cycle analysis**

A technique to assess the environmental impacts associated with all the stages of the life of a product – from raw material extraction through materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling (cradle-to-grave).

#### **Lifetime (in the atmosphere)**

The approximate amount of time it takes for concentrations of an atmospheric pollutant to return to the background level (assuming emissions cease) as a result of either being converted to another chemical compound or being taken out of the atmosphere through a sink. Atmospheric lifetimes can vary from hours or weeks (sulphate aerosols) to more than a century (CFCs).

#### **Livelihood**

(The way someone earns) the money people need to pay for food, a place to live, clothing, etc.

#### **Mainstreaming**

Taking into consideration as an integral part of the issue in question.

#### **Mangrove**

A tree or shrub that grows in chiefly tropical coastal swamps that are flooded at high tide. Mangroves typically have numerous tangled roots above ground and form dense thickets.

#### **Marginalization**

Treatment of a person, group, or concept as insignificant or peripheral.

#### **Mariculture**

The cultivation of marine organisms in their natural environment.

#### **Marine protected area (MPA)**

A geographically defined marine area that is designated or regulated and managed to achieve specific conservation objectives.





### **Market-based instrument**

Market-based instruments span a range of measures and approaches. Fundamentally, they are policy measures that influence outcomes through their effect on costs and profits. In the hands of policymakers, they can affect the operation of established markets or create new ones. They are commonly also referred to as 'economic' instruments because they attribute value to assets and directly affect decisions based on considerations of price and income.

### **Market-based/ Economic incentives**

Market-based approaches or incentives provide continuous inducements, monetary and near-monetary, to encourage polluting entities to reduce releases of harmful pollutants. As a result, market-based approaches create an incentive for the private sector to incorporate pollution abatement into production or consumption decisions and to innovate in such a way as to continually search for the least costly method of abatement.

### **Material flow accounting**

The quantification of all materials used in economic activities. It accounts for the total material mobilized during the extraction of materials and for the materials actually used in economic processes measured in terms of their mass.

### **Megacities**

Urban areas with more than 10 million inhabitants.

### **Merit goods**

Goods or services (such as education and vaccination) provided free for the benefit of the entire society by a government, because they would be under-provided if left to the market forces or private enterprise.

### **Merkel cell carcinoma**

A very rare disease in which malignant (cancer) cells form in the skin. Merkel cells are found in the top layer of the skin. These cells are very close to the nerve endings that receive the sensation of touch.

### **Methemoglobinemia**

A condition in which a higher-than-normal amount of methemoglobin is found in the blood. Methemoglobin is a form of hemoglobin that cannot carry oxygen. In methemoglobinemia, tissues cannot get enough oxygen. Symptoms may include headache, dizziness, fatigue, shortness of breath, nausea, vomiting, rapid heartbeat, loss of muscle coordination, and blue-colored skin. Methemoglobinemia can be caused by injury or being exposed to certain drugs, chemicals, or foods. It can also be an inherited condition.

### **Microbeads**

A tiny sphere of plastic (such as polyethylene or polypropylene).

### **Microbial and non-microbial contaminants**

Microbiological contamination refers to the non-intended or accidental introduction of microbes such as bacteria, yeast, mould, fungi, virus, prions, protozoa or their toxins and by-products. Prominent changes for product contamination include: loss of viscosity and sedimentation due to depolymerisation of suspending agents, pH changes, gas production, faulty smell, shiny viscous masses etc.

### **Microhabitat**

A habitat which is of small or limited extent and which differs in character from some surrounding more extensive habitat.

### **Microplastics**

Small plastic pieces, less than five millimeters long which can be harmful to our ocean and aquatic life.

### **Millennium Development Goals (MDGs)**

The eight Millennium Development Goals – which range from halving extreme poverty to halting the spread of HIV/AIDS and providing universal primary education, all by the target date of 2015 – formed a blueprint agreed to by all the world's countries and all the world's leading development institutions.

### **Monocultural farming systems**

The cultivation or growth of a single crop or organism especially on agricultural or forest land.

### **Morphology**

- (1) The physical characteristics of living organisms.
- (2) The branch of biology that deals with the form of living organisms, and with relationships between their structures.

### **Multilateral environmental agreements (MEAs)**

Treaties, conventions, protocols and contracts between several states regarding specific environmental problems.

### **Mycotoxin**

Mycotoxins are toxic compounds that are naturally produced by certain types of moulds (fungi). Moulds that can produce mycotoxins grow on numerous foodstuffs such as cereals, dried fruits, nuts and spices. Mould growth can occur either before harvest or after harvest, during storage, on/in the food itself often under warm, damp and humid conditions. Most mycotoxins are chemically stable and survive food processing.

### **Nanomaterial**

A natural, incidental or manufactured material containing particles, in an unbound state, as an aggregate or as an agglomerate and where, for 50 per cent or more of the particles in the number size distribution, one or more external dimension is in the size range 1–100 nanometres (a nanometre is one billionth of a metre). Such particles/materials are generally termed as nanoparticles, nanochemicals or nanomaterials.

### **Natural capital**

Natural assets in their role of providing natural resource inputs and environmental services for economic production. Natural capital includes land, minerals and fossil fuels, solar energy, water, living organisms, and the services provided by the interactions of all these elements in ecological systems.

### **Natural infrastructure**

Strategically planned and managed network of natural lands, such as forests and wetlands, working landscapes, and other open spaces that conserves or enhances ecosystem values and functions and provides associated benefits to human populations.

### **Natural resources**

Materials or substances such as minerals, forests, water, and fertile land that occur in nature and can be used for economic gain.



### **Nature's Contribution to People**

Nature's contribution to people (NCP) are all the contributions, both positive and negative, of living nature (i.e. diversity of organisms, ecosystems and their associated ecological and evolutionary processes) to the quality of life for people. Beneficial contribution from nature include such things as food provision, water purification, flood control and artistic inspiration, whereas detrimental contributions include disease transmission and predation that damages people or their assets. Many NCP may be perceived as benefits or detriment depending on the cultural, temporal or spatial context.

### **Neonicotinoid**

Neonicotinoids are an acetylcholine-interfering neurotoxic class of insecticides that are utilized in a variety of venues ranging from veterinary medicine, urban landscaping, and use in many agricultural systems as agents of crop protection. They can be applied by multiple methods as foliar sprays to above-ground plants, as root drenches to the soil, or as trunk injections to trees. However, it is estimated that approximately 60 per cent of all neonicotinoid applications globally are delivered as seed/soil treatments.

### **Net primary production (NPP)**

The rate at which all the plants in an ecosystem produce net useful chemical energy. Some net primary production goes toward growth and reproduction of primary producers, while some is consumed by herbivores.

### **Neurotoxin**

A poison which acts on the nervous system.

### **Nitrogen deposition**

The input of reactive nitrogen, mainly derived from nitrogen oxides and ammonia emissions, from the atmosphere into the biosphere.

### **Non-Hodgkins lymphoma**

Any of a large group of cancers of lymphocytes (white blood cells). Non-Hodgkin lymphomas can occur at any age and are often marked by lymph nodes that are larger than normal, fever, and weight loss. There are many different types of non-Hodgkin lymphoma. These types can be divided into aggressive (fast-growing) and indolent (slow-growing) types, and they can be formed from either B-cells or T-cells.

### **Non-state actors**

Non-state actors are categorized as entities that (i) participate or act in the sphere of international relations; organizations with sufficient power to influence and cause change in politics which (ii) do not belong to or exist as a state-structure or established institution of a state; do not have the characteristics of this, these being legal sovereignty and some measure of control over a country's people and territories.

### **Normalized Difference Vegetation Index**

To determine the density of green on a patch of land, researchers must observe the distinct colors (wavelengths) of visible and near-infrared sunlight reflected by the plants. As can be seen through a prism, many different wavelengths make up the spectrum of sunlight. When sunlight strikes objects, certain wavelengths of this spectrum are absorbed and

other wavelengths are reflected. The pigment in plant leaves, chlorophyll, strongly absorbs visible light (from 0.4 to 0.7  $\mu\text{m}$ ) for use in photosynthesis. The cell structure of the leaves, on the other hand, strongly reflects near-infrared light (from 0.7 to 1.1  $\mu\text{m}$ ). The more leaves a plant has, the more these wavelengths of light are affected, respectively.

### **No-till (zero tillage)**

A technique of drilling (sowing) seed with little or no prior land preparation, which has a positive impact on soil erosion.

### **Nutrient pollution**

Contamination of water resources by excessive inputs of nutrients.

### **Nutrients**

The approximately 20 chemical elements known to be essential for the growth of living organisms, including nitrogen, sulphur, phosphorus and carbon.

### **Ocean Acidification**

Term used to describe significant changes to the chemistry of the ocean. It occurs when carbon dioxide gas (or  $\text{CO}_2$ ) is absorbed by the ocean and reacts with seawater to produce acid. Although  $\text{CO}_2$  gas naturally moves between the atmosphere and the oceans, the increased amounts of  $\text{CO}_2$  gas emitted into the atmosphere, mainly as a result of human activities (e.g. burning fossil fuels), has been increasing the amount of  $\text{CO}_2$  absorbed by the ocean, which results in seawater that is more acidic.

### **Ocean eutrophication**

A process driven by the enrichment of water by nutrients, especially compounds of nitrogen and/or phosphorus, leading to: increased growth, primary production and biomass of algae; changes in the balance of organisms; and water quality degradation. The consequences of eutrophication are undesirable if they appreciably degrade ecosystem health and biodiversity and/or the sustainable provision of goods and services. Nitrogen and phosphorus are the primary inorganic nutrients responsible for the eutrophication of marine waters. Nitrogen and phosphorus occur naturally in marine waters, transferred from land via streams, rivers and runoff of rainwater and also from degradation of organic material within the water.

### **Oceanography**

The branch of science that deals with the physical and biological properties and phenomena of the sea.

### **Organic agriculture**

A production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of synthetic inputs.

### **Organic carbon (OC)**

Organic carbon, as used in climate research, usually refers to the carbon fraction of the aerosol that is not black. This term is an oversimplification because organic carbon may contain hundreds or thousands of different organic compounds with varying atmospheric behaviour. It is the quantity that results from thermal analysis of carbon aerosols.



### **Organizations**

Bodies of individuals with a specified common objective. Organizations could be political organizations, political parties, governments and ministries; economic organizations, federations of industry; social organizations (non-governmental organizations (NGOs) and self-help groups) or religious organizations (church and religious trusts). The term organizations should be distinguished from institutions.

### **Organochlorine compounds**

Any of a class of organic chemical compounds containing carbon, hydrogen and chlorine, such as dioxins, polychlorinated-biphenyls (PCBs) and some pesticides such as DDT.

### **Outmigration**

The action of leaving one place to settle in another, especially within a country.

### **Overexploitation**

The excessive extraction of raw materials without considering the long-term ecological impacts of such use.

### **Overgrazing**

Excessive grazing (feeding of livestock) which causes damage to grassland.

### **Overshoot**

The situation that occurs when humanity's demand on the biosphere exceeds supply or regenerative capacity. At the global level, ecological deficit and overshoot are the same, since there is no net import of resources to the planet.

### **Oxidant**

An oxidizing agent.

### **Ozone layer**

A region of the atmosphere situated at an altitude of 10–50 km above the Earth's surface (called the stratosphere) which contains diluted ozone.

### **ozone-depleting substances (ODSs)**

Volatile organic compounds (VOC) are organic chemicals that when released into the atmosphere can react with sunlight and nitrogen oxides (NO<sub>x</sub>) to form tropospheric (ground-level) ozone. Two general classes of pesticide products contribute the vast majority of pesticidal VOC emissions: fumigants and emulsifiable concentrates.

### **Panacea**

A solution or remedy for all difficulties or diseases.

### **Participatory approach**

Securing an adequate and equal opportunity for people to place questions on an agenda and to express their preferences about a final outcome during decision making to all group members. Participation can occur directly or through legitimate representatives. Participation may range from consultation to the obligation of achieving a consensus.

### **Particulate matter (PM)**

Tiny solid particles or liquid droplets suspended in the air.

### **Pastoralism**

The husbandry of domestic animals as a primary means of obtaining resources.

### **Pasture**

Ground covered with grass or herbage, used or suitable for the grazing of livestock.

### **Pathogen**

A bacterium, virus, or other microorganism that can cause disease.

### **Payment for environmental services/payment for ecosystem services (PES)**

Appropriate mechanisms for matching the demand for environmental services with incentives for land users whose actions modify the supply of those environmental services.

### **Peatland**

Peatlands are a type of wetlands that occur in almost every country on Earth, currently covering 3 per cent of the global land surface. The term 'peatland' refers to the peat soil and the wetland habitat growing on its surface.

### **Per- and polyfluoroalkyl substances**

Per- and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals that includes PFOA, PFOS, GenX, and many other chemicals. PFAS have been manufactured and used in a variety of industries around the globe, including in the United States since the 1940s. PFOA and PFOS have been the most extensively produced and studied of these chemicals. Both chemicals are very persistent in the environment and in the human body – meaning they don't break down and they can accumulate over time. There is evidence that exposure to PFAS can lead to adverse human health effects.

### **Perennial**

Lasting or existing for a long or apparently infinite time; enduring or continually recurring.

### **Peri-urban**

(Especially in Africa) denoting or located in an area immediately adjacent to a city or urban area.

### **Permafrost**

Soil, silt and rock located in perpetually cold areas, and that remains frozen year-round for two or more years.

### **Pernicious**

Having a harmful effect, especially in a gradual or subtle way.

### **Persistent organic pollutants (POPs)**

Chemical substances that persist in the environment, bioaccumulate through the food web, and pose a risk of causing adverse effects to human health and the environment.

### **Phenology**

The study of cyclic and seasonal natural phenomena, especially in relation to climate and plant and animal life.

### **Photoconjunctivitis**

Inflammation of the conjunctiva of the eye caused by exposure to UV.

**Photokeratitis**

Painful eye condition that occurs when your eye is exposed to invisible rays of energy called ultraviolet (UV) rays, either from the sun or from a man-made source.

**Phytoplankton**

Microscopically small plants that float or swim weakly in fresh or saltwater bodies.

**Planetary boundaries**

A framework designed to define a safe operating space for humanity for the international community, including governments at all levels, international organizations, civil society, the scientific community and the private sector, as a precondition for sustainable development.

**Plasticizers**

A substance (typically a solvent) added to a synthetic resin to produce or promote plasticity and flexibility and to reduce brittleness.

**Pneumonia**

Pneumonia is a bacterial, viral, or fungal infection of one or both sides of the lungs that causes the air sacs, or alveoli, of the lungs to fill up with fluid or pus. Symptoms can be mild or severe and may include a cough with phlegm (a slimy substance), fever, chills, and trouble breathing. Many factors affect how serious pneumonia is, such as the type of germ causing the lung infection, your age, and your overall health. Pneumonia tends to be more serious for children under the age of five, adults over the age of 65, people with certain conditions such as heart failure, diabetes, or COPD (chronic obstructive pulmonary disease), or people who have weak immune systems due to HIV/AIDS, chemotherapy (a treatment for cancer), or organ or blood and marrow stem cell transplant procedures.

**Policy diffusion**

The process of a policy being taken up, copied, implemented in other areas, fields, regions or sectors.

**Policy**

Any form of intervention or societal response. This includes not only statements of intent, but also other forms of intervention, such as the use of economic instruments, market creation, subsidies, institutional reform, legal reform, decentralization and institutional development. Policy can be seen as a tool for the exercise of governance. When such an intervention is enforced by the state, it is called public policy.

**Policymaker**

A member of a government department, legislature, or other organization who is responsible for making new rules, laws, etc.

**Pollutant**

Any substance that causes harm to the environment when it mixes with soil, water or air.

**Pollution**

The presence of minerals, chemicals or physical properties at levels that exceed the values deemed to define a boundary between good or acceptable and poor or unacceptable quality, which is a function of the specific pollutant.

**Polycentric**

Having many centres, especially of authority or control.

**Poverty**

The state of one who lacks a defined amount of material possessions or money. Absolute poverty refers to a state of lacking basic human needs, which commonly include clean and freshwater, nutrition, health care, education, clothing and shelter.

**Precautionary approach/principle**

The precautionary approach or precautionary principle states that if an action or policy has a suspected risk of causing harm to the public or to the environment, in the absence of scientific consensus that the action or policy is harmful, the burden of proof that it is not harmful falls on those taking the action.

**Prediction**

The act of attempting to produce a description of the expected future, or the description itself, such as "it will be 30°C tomorrow, so we will go to the beach."

**Premature deaths**

Deaths occurring earlier due to a risk factor than would occur in the absence of that risk factor.

**Primary energy**

Energy embodied in natural resources (such as coal, crude oil, sunlight or uranium) that has not undergone any anthropogenic conversion or transformation.

**Private sector**

The private sector is part of a country's economy which consists of industries and commercial companies that are not owned or controlled by the government.

**Projection**

The act of attempting to produce a description of the future subject to assumptions about certain preconditions, or the description itself, such as "assuming it is 30°C tomorrow, we will go to the beach."

**Protected area**

A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

**Provisioning services**

The products obtained from ecosystems, including, for example, genetic resources, food and fibre, and freshwater.

**Pterygium**

Growth of the conjunctiva or mucous membrane that covers the white part of your eye over the cornea. The cornea is the clear front covering of the eye. This benign or noncancerous growth is often shaped like a wedge. A pterygium usually doesn't cause problems or require treatment, but it can be removed if it interferes with your vision.

**Precision agriculture**

It involves the observation, impact assessment and timely strategic response to fine-scale variation in causative components of an agricultural production process. Therefore, precision agriculture may cover a range of agricultural enterprises, from dairy herd management through horticulture to field crop production. The philosophy can be also applied to pre- and post-production aspects of agricultural enterprises.

**Public sector**

The portion of society that comprises the general government sector plus all public corporations including the central bank.

**Public-private partnership**

A contractual agreement between a public agency (federal, state or local) and a private sector entity. Through such an agreement, the skills and assets of each sector (public and private) are shared in delivering a service or facility.

**Quasi-equity**

A form of company debt that could also be considered to possess some traits of equity, such as being non-secured by any collateral.

**Radiative forcing**

A measure of the net change in the energy balance of the Earth with space, that is, the change in incoming solar radiation minus outgoing terrestrial radiation.

**REDD/REDD+**

Reducing Emissions from Deforestation and Forest Degradation in Developing Countries. REDD+ involves enhancing existing forests and increasing forest cover. In order to meet these objectives, policies need to address enhancement of carbon stocks by providing funding and investments in these areas.

**Reforestation**

Planting of forests on lands that have previously contained forest, but have since been converted to some other use.

**Regulating services**

The benefits obtained from the regulation of ecosystem processes, including, for example, the regulation of climate, water and some human diseases.

**Remote sensing**

Collection of data about an object from a distance. In the environmental field, it normally refers to aerial or satellite data for meteorology, oceanography or land cover assessment.

**Renewable energy source**

An energy source that does not rely on finite stocks of fuels. The most widely known renewable source is hydropower; other renewable sources are biomass, solar, tidal, wave and wind.

**Resilience (Ecological)**

The capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks.

**Resilience-based management**

The focus on the processes that are essential to the ability of corals to withstand the effects of climate-related stress (resistance), and to recover (recruitment, growth survival) after major impacts.

**Resistance**

The capacity of a system to withstand the impacts of drivers without displacement from its present state.

**Resource management activities**

Activities related with the management of natural resources (monitoring, control, surveys, administration and actions for facilitating structural adjustments of the sectors concerned).

**Riparian**

Related to or located on the bank of a natural watercourse, usually a river, but sometimes a lake, tidewater or enclosed sea.

**River fragmentation**

Degree to which river connectivity and flow regimes have been altered, usually by dams and reservoirs.

**Riverine**

Relating to or situated on a river or riverbank; riparian.

**Run-off**

A portion of rainfall, melted snow or irrigation water that flows across the ground's surface and is eventually returned to streams. Run-off can pick up pollutants from air or land and carry them to receiving waters.

**Sahel**

A loosely defined strip of transitional vegetation that separates the Sahara desert from the tropical savannahs to the south. The region is used for farming and grazing, and because of the difficult environmental conditions at the border of the desert, the region is very sensitive to human-induced land-cover change. It includes parts of Senegal, the Gambia, Mauritania, Mali, Niger, Nigeria, Burkina Faso, Cameroon and Chad.

**Salinisation/salination**

The process by which water-soluble salts accumulate in the soil. Salinization may occur naturally or because of conditions resulting from management practices.

**Sand and dust storms**

Sand and dust storms are common meteorological hazards in arid and semi-arid regions. They are usually caused by thunderstorms – or strong pressure gradients associated with cyclones – which increase wind speed over a wide area. These strong winds lift large amounts of sand and dust from bare, dry soils into the atmosphere, transporting them hundreds to thousands of kilometres away. Some 40 per cent of aerosols in the troposphere (the lowest layer of Earth's atmosphere) are dust particles from wind erosion. The main sources of these mineral dusts are the arid regions of Northern Africa, the Arabian Peninsula, Central Asia and China. Comparatively, Australia, America and South Africa make minor, but still important, contributions. Global estimates of dust emissions, mainly derived from simulation models, vary between one and three Gigatons per year.

**Scale**

The spatial, temporal (quantitative or analytical) dimension used to measure and study any phenomena. Specific points on a scale can thus be considered levels (such as local, regional, national and international).

**Scenario**

A description of how the future may unfold based on if-then propositions, typically consisting of a representation of an initial situation, a description of the key drivers and changes that lead to a particular future state. For example, "given that we are on holiday at the coast, if it is 30°C tomorrow, we will go to the beach."

**Seagrass bed**

Profusion of grass-like marine plants, usually on shallow, sandy or muddy areas of the seabed.

**Seamounts**

Underwater mountain formed by volcanic activity.

**Secondary pollutant**

Not directly emitted as such, but forms when other pollutants (primary pollutants) react in the atmosphere.

**Security**

Relates to personal and environmental security. It includes access to natural and other resources, and freedom from violence, crime and war, as well as security from natural and human-caused disasters.

**Sediment**

Solid material that originates mostly from disintegrated rocks and is transported by, suspended in or deposited from water, wind, ice and other organic agents.

**Sedimentation**

Strictly, the act or process of depositing sediment from suspension in water or ice. Broadly, all the processes whereby particles of rock material are accumulated to form sedimentary deposits. Sedimentation, as commonly used, involves transport by water, wind, ice and organic agents.

**Sequestration**

In GEO-5, sequestration refers to the capture of carbon dioxide in a manner that prevents it from being released into the atmosphere for a specified period of time.

**Sex-disaggregated data**

Sex-disaggregated data is data that is cross-classified by sex, presenting information separately for men and women, boys and girls. Sex-disaggregated data reflect roles, real situations, general conditions of women and men, girls and boys in every aspect of society. For instance, the literacy rate, education levels, business ownership, employment, wage differences, dependants, house and land ownership, loans and credit, debts, etc. When data is not disaggregated by sex, it is more difficult to identify real and potential inequalities. Sex-disaggregated data is necessary for effective gender analysis.

**Sharing economy**

The peer-to-peer-based activity of obtaining, giving, or sharing the access to goods and services, coordinated through community-based online services.

**Short-term climate forcers**

Substances such as methane, black carbon, tropospheric ozone, and many hydrofluorocarbons, which have a significant impact on climate change, and a relatively short lifespan in the atmosphere compared to carbon dioxide and other longer-lived gases.

**Siltation**

The deposition of finely divided soil and rock particles on the bottom of stream and riverbeds and reservoirs.

**Silvopastoral production systems**

The integration of trees and shrubs in pastures with animals for economic, ecological and social sustainability.

**Smart cities**

A smart city is a designation given to a city that incorporates information and communication technologies (ICT) to enhance the quality and performance of urban services such as energy, transportation and utilities in order to reduce resource consumption, wastage and overall costs. The overarching aim of a smart city is to enhance the quality of living for its citizens through smart technology.

**Social amenities**

Refer to places, buildings or infrastructural facilities which are to be shared and to become convergence spots for the local and surrounding communities. It has become a basic necessity for villages and settlement areas to have well-built and complete social amenities for the benefit of the local and surrounding communities, so as to facilitate them in conducting social functions and activities, which in turn would help shape a united, harmonious, advanced, dynamic and progressive society.

**Social ecological systems**

Complex adaptive systems composed of many diverse human and non-human entities that interact. They adapt to changes in their environment and their environment changes as a result.

**Social network**

A social structure made up of a set of actors, such as individuals or organizations, and the ties between these actors, such as relationships, connections or interactions.

**Socioeconomic**

Of, relating to, or involving a combination of social and economic factors.

**Soft law**

Rules that are neither strictly binding in nature nor completely lacking legal significance. They are weakened along one or more of the dimensions of obligation, precision and delegation. In the context of international law, soft law refers to guidelines, policy declarations or codes of conduct which set standards of conduct. However, they are not directly enforceable.

**Spawning (fisheries)**

To deposit or fertilize spawn; to produce young especially in large numbers.



### **Species (biology)**

An interbreeding group of organisms that is reproductively isolated from all other organisms, although there are many partial exceptions to this rule. A generally agreed fundamental taxonomic unit that, once described and accepted, is associated with a unique scientific name.

### **Species diversity**

Biodiversity at the species level, often combining aspects of species richness, their relative abundance and their dissimilarity.

### **Species richness**

The number of species within a given sample, community or area.

### **Spillover effect**

The trickle down of growth from one region to another.

### **Stewardship**

The job of supervising or taking care of something, such as an organization or property.

### **Strategic environmental assessment (SEA)**

A range of analytical and participatory approaches that aim to integrate environmental considerations into policies, plans and programmes and evaluate the links with economic and social considerations. An SEA is undertaken for plans, programmes and policies. It helps decision makers reach a better understanding of how environmental, social and economic considerations fit together.

### **Stratospheric ozone depletion**

Chemical destruction of the stratospheric ozone layer, particularly by substances produced by human activities.

### **Surface water**

All water naturally open to the atmosphere, including rivers, lakes, reservoirs, streams, impoundments, seas and estuaries. The term also covers springs, wells or other collectors of water that are directly influenced by surface waters.

### **Sustainability**

A characteristic or state whereby the needs of the present population can be met without compromising the ability of future generations or populations in other locations to meet their needs.

### **Sustainable agriculture**

Sustainable Agriculture puts the emphasis on methods and processes that improve soil productivity while minimising harmful effects on the climate, soil, water, air, biodiversity and human health. It aims to minimise the use of inputs from nonrenewable sources and petroleum-based products and replace them with those from renewable resources. It focuses on local people and their needs, knowledge, skills, socio-cultural values and institutional structures. It ensures that the basic nutritional requirements of current and future generations are met in both quantity and quality terms. It provides long-term employment, an adequate income and dignified and equal working and living conditions for everybody involved in agricultural value chains. It reduces the agricultural sector's vulnerability to adverse natural conditions (e.g. climate),

socioeconomic factors (e.g. strong price fluctuations) and other risks.

### **Sustainable development**

Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.

### **Sustainable forest management (SFM)**

The stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and potential to fulfill, now and in the future, relevant ecological, economic and social functions, at local, national and global levels, and that does not cause damage to other ecosystems.

### **Synergies**

These arise when two or more processes, organizations, substances or other agents interact in such a way that the outcome is greater than the sum of their separate effects.

### **System**

A system is a collection of component parts that interact with one another within some boundary.

### **Taxonomy**

A system of nested categories (taxa) reflecting evolutionary relationships or morphological similarities.

### **TechnoGarden**

The TechnoGarden scenario depicts a globally connected world relying strongly on technology and highly managed, often engineered ecosystems, to deliver ecosystem services.

### **Technology transfer**

A broad set of processes covering the flows of know-how, experience and equipment among different stakeholders.

### **Technology**

Physical artefacts or the bodies of knowledge of which they are an expression. Examples are water extraction structures, such as tube wells, renewable energy technologies and traditional knowledge. Technology and institutions are related. Any technology has a set of practices, rules and regulations surrounding its use, access, distribution and management.

### **Temperate region**

The region in which the climate undergoes seasonal change in temperature and moisture. Temperate regions of the Earth lie primarily between 30° and 60° latitude in both hemispheres.

### **Theory of change**

A theory of change is a method that explains how a given intervention, or set of interventions, is expected to lead to specific development change, drawing on a causal analysis based on available evidence.

### **Thermohaline circulation**

Large-scale density-driven circulation in the ocean, caused by differences in temperature and salinity. In the North Atlantic, the thermohaline circulation consists of warm surface water flowing northward and cold deep water flowing southward, resulting in a net poleward transport of heat. The surface

water sinks in highly restricted sinking regions located in high latitudes. Also referred to as the (global) ocean conveyor belt or the meridional overturning circulation.

#### **Threshold**

The level of magnitude of a system process at which sudden or rapid change occurs. A point or level at which new properties emerge in an ecological, economic or other system, invalidating predictions based on mathematical relationships that apply at lower levels.

#### **Tipping point**

The critical point in an evolving situation that leads to a new and sometimes irreversible development.

#### **Top-down**

Used to refer to a situation in which decisions are made by a few people in authority rather than by the people who are affected by the decisions.

#### **Topography**

The study or detailed description of the surface features of a region.

#### **Traditional or local ecological knowledge**

A cumulative body of knowledge, know-how, practices or representations maintained or developed by peoples with extended histories of interaction with the natural environment.

#### **Transformation**

State of being transformed. In the context of GEO-5, transformation refers to a series of actions that explores opportunities to stop doing the things that pull the Earth System in the wrong direction and at the same time provide resources, capacity and an enabling environment for all that is consistent with the sustainable-world vision.

#### **Transformational change**

The process whereby positive development results are achieved and sustained over time by institutionalizing policies, programmes and projects within national strategies. It should be noted that this embodies the concept of institutionally sustained results – consistency of achievement over time. This is in order to exclude short-term, transitory impact.

#### **Transformative pedagogy**

A progressive educational approach that includes democratic constructivist-based pedagogy for the promotion of social justice and democratic ideals to transform students and society. Transformative pedagogy empowers learners to engage in dialogue to co-construct meaning from educational material and experiences through an inquiry-based approach (as opposed to what Paulo Freire calls a “banking” orientation). It also promotes personal experiences, dialogical pedagogy, and aligning education with social justice.

#### **Transitions**

Non-linear, systematic and fundamental changes of the composition and functioning of a societal system with changes in structures, cultures and practices.

#### **Transpiration**

The loss of water vapour from parts of plants, especially in leaves but also in stems, flowers and roots.

#### **Trillion**

10<sup>12</sup> (1 000 000 000 000).

#### **Trophic level**

Successive stages of nourishment as represented by the links of the food chain. The primary producers (phytoplankton) constitute the first trophic level, herbivorous zooplankton the second and carnivorous organisms the third trophic level.

#### **Tropospheric ozone**

Ozone at the bottom of the atmosphere, and the level at which humans, crops and ecosystems are exposed. Also known as ground-level ozone.

#### **Urban agglomeration**

The population contained within the contours of a contiguous territory inhabited at urban density levels without regard to administrative boundaries.” In other words, it integrates the ‘City Proper’ plus suburban areas that are part of what can be considered as city boundaries; a term that in itself is controversial.

#### **Urban sprawl**

The decentralization of the urban core through the unlimited outward extension of dispersed development beyond the urban fringe, where low density residential and commercial development exacerbates fragmentation of powers over land use.

#### **Urbanism**

An integration of urban and rural development in terms of sustainable resource use and the convergence of human well-being.

#### **Urbanization**

An increase in the proportion of the population living in urban areas.

#### **Venture capital**

Venture capital is capital that is invested in projects that have a high risk of failure, but that will bring large profits if they are successful.

#### **Virtual water trade**

The idea that when goods and services are traded, the water needed to produce them (embedded) is traded as well.

#### **Volatile Organic Compounds (VOCs)**

Volatile organic compounds (VOC) means any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate, which participates in atmospheric photochemical reactions, except those designated by EPA as having negligible photochemical reactivity.

#### **Vulnerability**

An intrinsic feature of people at risk. It is a function of exposure, sensitivity to impacts of the specific unit exposed (such as a watershed, island, household, village, city or country), and the ability or inability to cope or adapt. It is multi-dimensional, multi-disciplinary, multi-sectoral and dynamic. The exposure is to hazards such as drought, conflict or extreme price fluctuations, and also to underlying socio-economic, institutional and environmental conditions.





**Wastewater treatment**

Any of the mechanical, biological or chemical processes used to modify the quality of wastewater in order to reduce pollution levels.

**Water column**

An imaginary column extending through a water body from its floor to its surface.

**Water quality**

The chemical, physical and biological characteristics of water, usually in respect to its suitability for a particular purpose.

**Water scarcity**

Occurs when annual water supplies drop below 1 000 m<sup>3</sup> per person, or when more than 40 per cent of available water is used.

**Water security**

A term that broadly refers to the sustainable use and protection of water systems, the protection against water related hazards (floods and droughts), the sustainable development of water resources and the safeguarding of (access to) water functions and services for humans and the environment.

**Water stress**

Occurs when low water supplies limit food production and economic development, and affect human health. An area is experiencing water stress when annual water supplies drop below 1 700 m<sup>3</sup> per person.

**Wetland**

Area of marsh, fen, peatland, bog or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water to a depth, at low tide, that does not exceed 6 metres.

**Whole-genome sequencing**

A laboratory process that is used to determine nearly all of the approximately 3 billion nucleotides of an individual's complete DNA sequence, including non-coding sequence.

**Wildlife**

Wild animals collectively; the native fauna (and sometimes flora) of a region.

**Woodland**

Wooded land, which is not classified as forest, spanning more than 0.5 hectares, with trees higher than 5 metres and a canopy cover of 5–10 per cent, or trees able to reach these thresholds *in situ*, or with a combined cover of shrubs, bushes and trees above 10 per cent. It does not include areas used predominantly for agricultural or urban purposes.

**Zettabyte**

A unit of information equal to one sextillion (10<sup>21</sup>) or, strictly, 2<sup>70</sup> bytes.

**Zika**

A mosquito-borne virus of the genus *Flavivirus* (family *Flaviviridae*), found in parts of Africa and in Malaysia; it causes Zika fever.

**Zoonotic disease**

(Also known as zoonosis) An infection or disease that is transmissible from animals to humans under natural conditions.

