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March 25, 2023

## Outcomes Document

### First Authors Meeting for the Seventh Edition of UNEP's Global Environment Outlook (GEO-7)

**March 13-17, 2023**  
**United Nations Conference Centre (UNCC)**  
**Rajdamnern Nok Avenue Bangkok 10200, Thailand**  
**[www.unescap.org/uncc](http://www.unescap.org/uncc)**

#### Agenda items included:

1. Expand the annotated outline and agree the drafting process of the Introduction and Drivers/Pressures chapters
2. Expand the annotated outline and agree the drafting process for the State and Trends of the Environment chapters
3. Expand the annotated outline and agree the drafting process for the Policy chapters
4. Expand the annotated outline and agree the drafting process for the Outlooks chapters
5. Where possible, begin the drafting process for the chapters.
6. Any other business
7. Closing of the meeting

#### On these agenda items the team agreed:

- On the importance for authors to focus on how solutions pathways will transform the five interdependent systems.
- The authors from the **Cross-cutting triple planetary crisis issues** in the State and Trends chapters will connect with and support the **Drivers and Pressures** chapter when drafting the Pressures sections, providing an overview of the 3+1 issues across the section.
- The co-chairs of the assessment will review and provide comments on all chapter outlines in the following weeks.
- The order of the **Interlinkages across the Regions** chapter and **SDG (Sustainable Development Goals)** chapter should be changed. The suggestion is that Chapter 7 will be **Implications of environmental change on the SDGs** and Chapter 8 **Interlinkages across Regions**.
- All groups should work on the GEO-7 Workspace to ensure each author can follow the work and updates from other chapters at any point. In case authors experience difficulties with the GEO-7 Workspace, they should contact [unep-ewad-geohelpdesk@un.org](mailto:unep-ewad-geohelpdesk@un.org).
- Authors should provide the Secretariat with recommendations on additional authors. The gap filling exercise will allow for additional expertise for various chapters. The Secretariat will set up calls in the following two weeks for authors to review the nomination database and select any additional authors required for their chapters.

Geographic and gender balance should be observed during this selection process.

- The list of additional authors identified during the gap filling exercise will be reviewed and shared with the co-chairs, the IMAG and MESAG for their review and feedback. The selected additional authors will be contacted by the Secretariat and will begin working with their author teams.
- A final list of policy questions from IMAG and MESAG will be shared with the authors. These policy questions will be finalized in early May to help develop the narrative in each chapter.
- IMAG and MESAG will produce a guidance document on sub-regional definitions aligned with the five UN (United Nations) Regions.
- UNEPs Secretariat liaison focal points will support each chapter and handle administrative issues such as organizing chapter calls with the author teams and where available the co-chairs, they will share any relevant information with the co-chairs as well as the IMAG and MESAG groups and perform other Secretariat support duties when required.
- The Fellows should provide support on the creation of content in the chapter. This will include managing citations and references, creating graphs, maps and drafting some portions of the analysis when necessary. A second cohort of fellows will be selected to have two Fellows per chapter.
- Co-chairs should meet with the CLAs (Coordinating Lead Authors) virtually at least once a month.

### ***Meeting Summary***

#### **Day 1: Opening of the authors meeting and adoption of agenda**

The meeting began with opening remarks from the Deputy Secretary of the Ministry of Environment and Natural Resources in Thailand, the co-chairs of the assessment and representatives from the Secretariat.

The co-chairs of the assessment opened the working session of the meeting with an overview of what is expected of the GEO-7 report and welcomed the experts in the room to the meeting. The Secretariat gave a brief overview of the two different workshops on Modeling and Scenario and Policy Responses and Solutions Pathways that took place the week before the meeting. A video presentation from UNEP's Executive Director followed, she stressed the importance of the GEO report and why it should be a more solutions-oriented report. UNEPs Regional Director from Asia Pacific Office also gave an opening remark, welcoming the authors and experts to the meeting where she stated that since the GEOs inception in 1995, the GEO process has been crucial to fulfilling UNEP's mandate of keeping the world environment under review and informing decision makers and governing bodies while strengthening UNEP's role in the science policy interface.

The Deputy Secretary from the Ministry of Natural Resources and Environment of Thailand emphasized the importance of the GEO and gave a brief overview of the environmental challenges Thailand faces and the steps that have been taken to address these challenges. Following the Deputy Secretary's remarks, the Secretariat went over the agenda of the five-day meeting, explaining the

items for each day and requested for the adoption of the agenda. The meeting agenda was adopted on a no-objection basis.

Following the break, the Secretariat welcomed the co-chairs of the assessment to take the experts through the next part of the agenda, reviewing the adopted annotated outline and discussion of drafting approach for different chapters. Co-chairs started with a presentation on the approved annotated outline, followed by a GEO-7 timeline and its key elements, presented by the Secretariat.

After the various interventions from the experts, the Secretariat moved to the next agenda item and invited the experts from the Modelling and Scenarios and Solutions Pathways Methodology workshops to present the outcomes of the two workshops. The presentation on the Solutions Pathways gave an understanding of what solution pathways are and explained the agreed steps for a methodology to develop those solutions pathways. It also explained how the group assessed different pathways frameworks to define the levers and entry points for the solutions pathways. Finally explained the understanding of what actions mean and the different typologies. The next presentation on the outcome of the Modelling and Scenarios workshop explained how the GEO\_7 will be using the modeling to create a limited number of scenarios and storylines to then provide solutions pathways to help achieve each scenario. The group agreed to develop storylines and scenario protocols with systems and levers and to develop a draft model framework which would further develop and refine a mega-model linking several individual and existing model frameworks together. The presentation also explained the need to further discuss uncertainties on modelling and scenarios and to agree on how to address these uncertainties. The presentation concluded by emphasizing the need to start drafting outlines for the respective Modelling and Scenario chapters and identifying synergies across other chapters or sections in GEO-7.

### **Orientation sessions**

After the first session's presentations, the Secretariat proceeded to the next item on the agenda on the **Principles of Writing Assessments**. The orientation session focused on providing examples of the type of writing style required for the GEO-7 report. The Secretariat emphasized that the assessment should be scientifically credible, based on existing research, well-referenced, and summarized in a way that makes it readable. The second session discussed how **Behavioral Science** can be incorporated into the GEO-7 report. Experts learned about Behavioral Science and how the content should be solutions-focused and behaviorally informed.

The next presentation was on **Educational Materials for Science Diplomacy**, a course that aims to motivate and enable young scientists to better shape environmental policy decisions. This education course material addresses the outcomes of GEO-6 (Global Environmental Outlook 6) and will be used in the preparation of GEO-7. The course will be provided to all GEO-7 Fellows. The next presentation was on the **Digital Transformation of GEO**, where the group of developers presented the digital collaboration workspace that will be used by the authors during the GEO-7 report. The presentation covered the GEO-7 Workspace and the different functionalities of the platform that authors can use when drafting the report.

A representative from UNEP's communication division then presented the updated [GEO Website](#), discussing the changes made to improve the accessibility of GEO reports and different content on the website. The next presentation was on the **Guidance on Citations, Referencing, and Style guide for**

**UNEP's Publications.** The session focused on the selection and organization of references, permissions, types of attributions, and the reference management software to be used for the GEO-7 report. The final presentation was on the **Use of Visuals in the GEO Assessments**, which discussed the importance of using several types of visuals, how and why to use them, including maps, graphs, and infographics.

## **Day 2: Parallel planning sessions and side event**

The second day of the meeting began with a brief recap of the previous day and the agenda for the day. The Secretariat informed the authors that the Intergovernmental and Multistakeholder Advisory Group (IMAG) and the Multidisciplinary Expert Scientific Advisory Group (MESAG) have their own meetings running in parallel with the authors' meeting. The Fellows were taking an orientation session on the GEO-7 digital platform and Power BI tool training for the development of graphs and maps for the report.

After the morning plenary session, the authors separated into four parallel sessions to work on the four sections of the report: **Overview and Context, State and Trends of the Environment, Policy Responses** and **Solutions Pathways and Outlooks**. A summary of the parallel sessions is presented below.

Additionally, a side event titled **"Energy transition and natural resources – global and regional discussions"** was organized before the lunch break. The event focused on the role of the Asia Pacific region in the transition to sustainable energy systems, proposed actions to reach this goal including examples from other countries expanding the conversation to the importance of critical minerals for the energy system. The event explored the key elements to be considered for a transition to more sustainable energy systems and proposed actions to reach this goal.

The event opened with two keynote presentations from the Ministry of Energy in Thailand and the International Resource Panel followed by an expert dialogue. The main discussions points were:

- Current environmental issues of Thailand and the Asia-Pacific region, specifically focusing on energy systems and climate change issues.
- Steps needed for an environmentally sustainable energy transition focusing on the need for critical minerals, at a global and regional perspective.
- Innovative solutions and technologies that can help accelerate the energy transition and circularity in the region and globally.
- Regional policy, technology and behavioural change recommendations to reach these goals.
- How the GEO-7 can inform policymaking for the energy transition.

The discussion also included ways in which material use/natural resource management can be optimized for the decarbonization of the energy system in the Asia Pacific region.

### **Parallel planning session**

#### **Overview and Context**

##### **Introduction**

The authors initiated a brainstorming discussion on the introduction chapter of the report. The main outcomes from these discussions were:

- The findings of latest major global scientific assessments will be reviewed, and the progress made by other author groups will be added.
- The chapter will seek to give an overview of what needs to be done to achieve transformative change.
- It's important to give an outline of the other chapters stating that the foundation of GEO-7 is not only from GEO-6, but also the latest findings from other important assessments reports (eg IPCC; IPBES; IRP, etc.)

### **Drivers and Pressures**

The authors initiated a brainstorming discussion on each of the 4 main drivers (i.e., population, economic development, technology and development, urbanization) from the Procedures Document. The main outcomes from these discussions were:

- Ways to make the DPSIR+ framework work for GEO-7. The authors discussed the importance of establishing interlinks and interconnections between drivers and pressures.
- Adding more drivers would not be a good idea due the word-count limit. Drivers (how it changes) pressures (where it changes) impacts (why it is urgent to change now).
- There is a need to build a diagram to facilitate the understanding of the interconnections between drivers and its interactions with the pressures.
- Finding ways to integrate each of the drivers to the pressures in each session and create a final section to explore the interconnections between the different drivers.

### **States and Trends of the Environment**

The aim of this discussion was for all authors from the various chapter groups in this section to have a shared outline structure. The main outcomes from these discussions were:

- Each chapter group gained an understanding on the 3+1 crises and how to integrate them into their respective chapters.
- All groups, after much discussion, agreed on an outline that each chapter group would follow.
- The need for each group to begin to populate information relevant to their chapter from the discussions held during the brainstorm session for this section.
- All groups gained a common understanding of the DPSIR+ framework and the need to engage with the Drivers and Pressures author group to avoid duplication of information across chapters.

### **Policy and Solutions Pathways**

The aim of this group discussion was to have an intervention from each chapter group on the key issues they would include and to have a group discussion on the levers and the methodology for developing the solutions pathways. The main outcomes from these discussions were:

- The importance of having a common understanding of what transformation is and the difference with transition. There were several definitions for this concept and the co-chairs proposed to the authors to send in writing their proposed definitions of *transformation* and *transition*.

- The group proposed to look into historical transformations to identify key factors of success. The group agreed on including the issues of barriers and accelerating factors and the winners and losers for transformation as part of Chapter 9 but also in each of the 5 systems in a more specific way.
- The group revised the proposed list of levers, one of the outcomes from the Solutions Pathways Workshop. The list of levers combined GSDR (Global Sustainable Development Report) 2023 and IPBESs (Intergovernmental Platform on Biodiversity and Ecosystem Services) levers. They were further re-shaped to suit the purpose of GEO-7.
- The group also discussed the 7-steps methodology for transformational pathways.
- Every system in this section reviewed their chapter description in the annotated outline and received comments from other authors on potential key issues to include.

## Outlooks

The aim of this group discussion was for the author team to deepen their understanding on matters that would be discussed in their respective chapters. The main outcomes from these discussions were:

- An understanding of the importance of keeping the DPSIR pathway in mind, and to maintain consideration of the different paths implemented before, and of what happens in the future.
- An understanding of the exchange between the outlooks and policy groups; this chapter not only collects inputs from other chapters but also sets the tone for GEO-8.
- The group noted that more information on drivers, indicators, etc. is required for the outlooks group.
- It was noted that Chapters 17 and 18 can make progress on cross-cutting issues, and indicators would help develop more detailed targets.
- The group noted the variability of different indexes available to group countries and the need to find agreement on the ones to use.

## Chapter 21: Driving the Transformation

Authors met with the co-chairs to discuss the organization for this chapter. The co-chairs explained the following:

- The chapter will be a conclusion chapter developed at a later stage based on the outcomes of solutions pathways and outlooks sections.
- The authors should continue engaging and participating as observers in the discussions with the other chapters.
- The authors are not expected to start drafting this chapter until the solutions pathways and outlooks chapters are more advanced.

## Day 3 to Day 5: Plenary session: How to write an assessment

The third day of the meeting began with an orientation plenary session from the GEO-7 co-chair on **How to write an Assessment**. The objective for this session was to ensure that the participants were made aware of the difference between writing an environmental assessment and writing scientific

articles. The co-chair clarified the fundamental differences between an assessment and a review and discussed how to write a chapter executive summary and the Summary for Policy Makers.

The following were the main take-aways for this orientation session:

- An assessment is an evaluation of information, for the purpose of guiding decisions on complex, interconnected and wicked problems and policy issues.
- An assessment can perform new runs of old models, and synthesis of data sets is permissible, without these being considered primary research (which is not admitted in an assessment)
- Chapters' executive summaries are a key component of an assessment and must summarize the most important findings of the chapter.
- The Summary for Policy Makers (SPM) will be based predominantly on the chapters' executive summaries and should be written in less technical language.

### **Parallel planning sessions**

From day 3 to day 5, the author groups continued with the parallel planning sessions in the separate sections. The groups broke off into different rooms and continued brainstorming and drafting their various chapter outlines. Some of the author groups met with other author groups from various related chapters to establish linkages within their chapters and to avoid text duplications. The focus was as follows:

- Further discuss the details of the outline including adding subsections, titles, division of word count, etc.
- Identify the objectives of each chapter and discuss priorities of what should be included.
- Discuss the division of tasks among the authors and the Fellows of each chapter.
- Identify potential gaps in expertise and propose names of authors/experts to be selected.

### **Overview and Context**

The overview section included the authors from the Introduction and Drivers and Pressures chapters. The teams discussed the format of their chapters and began drafting the annotated chapter outline. The Introduction chapter authors engaged with author teams from various chapters to set the outline and discussed the sections to include in the chapter which will give an overview of the report.

The Drivers chapter authors discussed the annotated outline of the chapter, among the discussions, they discussed the importance of establishing the interlinks and interconnections between drivers and pressures. The authors also expressed the need for additional authors for this chapter.

### **State and Trends of the Environment**

In the States and Trends chapters, the author teams major outcomes were the development of the draft annotated chapter outline. The authors discussed to provide an integrated analysis of environmental trends and impacts at the regional and sub-regional levels, as well as between/ across regions to help facilitate an identification of critical entry points for action and decision-making at the sub-global scales. It was also agreed to switch the order of the regional chapter and SDG chapter. The

Environmental change on SDG will be Chapter 7 and Regional State and Trends chapter will be Chapter 8.

### **Policy and Solutions Pathways**

The Policy and Solutions Pathways group met to finalize the review of the annotated outline, with a focus on connecting levers with systems, governance and governments, classifying countries into groups, and empowering less powerful groups to take action. The authors of each policy chapter then met separately to brainstorm on how to adapt the outline to the structure agreed in the policy chapters joint sessions, identify objectives of the chapter, add more details to the outline, discuss division of tasks among the authors and fellows, identify potential gaps in expertise, and develop a work plan to deliver the first order draft.

### **Outlooks**

The Outlooks group met to discuss the focus of the report on the triple planetary crisis within the four environmental spheres, and the need for system-relevant targets. They identified various environmental and socio-economic goals that were relevant to the model framework but noted that some indicators remained undefined or absent in certain environmental sectors. The targets were aligned with the model's capabilities, but a clear description of the model boundary was needed. The group discussed their roles and responsibilities, gap fillings, and collaborations between different environmental state chapters to ensure the model reporting was aligned.

### **Final plenary session: Presentations from each group**

The last day of the meeting requested all the groups to give a 5-minutes presentation including the achievements they made of the week, gaps in expertise identified in the author teams and workplan towards the June and September on-line meetings and the production of a first-order draft by January 2024. The Secretariat reminded authors that all the slides should be added on the GEO-7 workspace for group review and the Co-chairs mentioned that they might make generic comments after all the presentations, but the outlines drafted by each chapter would be reviewed in more detail after the meeting. Substantive comments from Co-chairs will be coming in following weeks through calls to be arranged by the secretariat liaison persons between the co-chairs and each individual chapter team.

### **Chapter 1: Introduction**

The authors started the presentation explaining key elements of the annotated outline. The chapter will include 6 sub-sections to attract a global audience. The presentation provided an overview of what the authors of the chapter wish to address; It will highlight the main differences between GEO 6 and GEO-7. The chapter will present the digital transformation aspect of GEO-7, the analytical approach and the assessment frameworks to be used. The chapter will also give an overview of transformative change and why it is urgent. The chapter will also highlight the solutions-based approach of GEO-7.

Apart from presenting key elements of the chapter, the authors presented progress made in reviewing available resources, meeting other author groups for interactive communication and drafting a detailed work plan.

The authors discussed the following:



- To include boxes containing information and figures from various regional reports, with a focus on solutions and an emphasis on being anticipative of future developments.
- To provide insights on the implementation of Sustainable Development Goals (SDGs) and highlight deadlines and baselines with reference to global targets.
- To include a figure to show how the GEO-7 fits among other assessments and frameworks published between 2019 and 2022.
- To consider the environmental impact of different shocks such as pandemics, disasters, and conflicts.
- To elaborate the chapter outline and 20-30% drafting of the first four sub-sections before first author team meeting and the outputs of the author team meeting will be presented at the next authors meeting in June.

## **Chapter 2: Drivers and Pressures**

The author started the presentation of the draft outline of each section of the chapter and mentioned the expertise required for the gap filling exercise. The key elements of this chapter are Overview, Key drivers, Cross-cutting drivers, Pressures and Interactions among the drivers. The authors acknowledged the challenges of covering a wide range of topics and identified gaps there.

The authors discussed the following:

- The need to create a diagram to show the interconnections between drivers and pressures and decided to integrate each driver with its corresponding pressure, as well as explore the interconnections between drivers.
- The need to include three additional drivers: socio-cultural, political-institutional, and shocks.
- The DPSIR+ framework will be applied in conjunction with other frameworks, (e.g., the United Nations Secretary General's Global Sustainable Development Report (GSDR) levers and entry points, IPCC's sustainability framework, IPBES's nature futures framework, among others) when assessing the opportunities and barriers for transformational change.
- Teams meeting will be organized as many as needed to work on the draft.

## **Chapter 3: Air**

The author started the presentation with a brief of the achievements made during the discussion sessions, the group work mechanisms, how they will develop chapter outlines and identify links to other chapters as well as the key scientific literature to be used in the chapter. The key elements of this chapter include Introduction, Planetary crises, Human systems, Feedback to planetary crisis from air and Conclusions. The gaps identified by this team included lead authors and Fellows, they expressed the need for additional expertise in various sections of the chapter.

The authors discussed the following:

- To highlight the changes made since the GEO-6 report. These will be covered in the introduction section.
- Recent scientific reports e.g., IPCC and others will be mentioned to ensure the information is aligned.

- The suggested authors list will be submitted.
- The annotated outline should be finalized in April and the drafting process will begin in May.

#### **Chapter 4: Land and Soils**

The authors of this chapter started the presentation with a brief of accomplishment including getting familiar with working mechanism. The authors brainstormed the matrix proposed by the Water Chapter author group to identify impacts of the 3+1 crises on land and soil. Following the parallel planning sessions, the authors grouped the outputs from the discussions with different author groups to create a draft outline for the chapter. The key elements of the annotated outline include various sections i.e., an introduction, planetary crisis (description of pressures of the crises on the natural systems, information on states and trends of lands and soils), human systems (food, energy etc.), feedback to planetary crises and a conclusion.

The authors discussed the following:

- To develop the annotated outline from discussions across States and Trends chapter teams to create the first draft and include cross referencing with the 3+1 crises authors.
- Ensure that the chapter is drafted on the GEO-7 Workspace as is expected.
- The areas that require additional expertise to start the drafting process of the chapter.
- The introduction section will include general information on the terrestrial natural system, a box describing key messages from related reports since GEO-6 and a chapter outline.
- The planetary crises section will give a description of pressures of the crises on the natural system and information on states and trends of land and soils.
- The human systems section will discuss the impacts of state and trends in land and soils in different systems e.g., food, energy, livelihoods etc.
- The conclusions to be developed will be brief references to solutions which will act as a link to the policy sections of the report.

#### **Chapter 5: Oceans and Coasts**

The author of this chapter started the presentation with a brief on the outcomes of the discussions and the coordinated work with other chapters within State and Trends and Planetary Crises. The author explained that the chapter draws on previous assessments and recent academic literature. The key elements of the annotated outline include various sections i.e., an introduction, planetary crisis (implications for marine and coastal ecosystems), human systems, feedback to planetary crises and a conclusion.

The authors discussed the following:

- The need for additional authors of various expertise required to draft the chapter and fellows.
- Start the draft chapter outline immediately the authors are identified and assigned to different sections.
- The general outline for the natural systems' chapters (Air, Water, Land and Soils and Oceans and Coast).
- Recent scientific assessment/reports will be used to identify further impacts, prioritize and elaborate on such impacts e.g. GEO-6 (UNEP, 2019), global assessments released after 2018,

e.g. IPCC 6th Report Assessment (2022)

### **Chapter 6: Freshwater**

The author started the presentation by highlighting the outcomes of the week stating the different options explored during the sessions to map crises on natural and human water systems. The key elements of the annotated outline include various sections i.e., the introduction, planetary crises and natural water systems e.g., climate change etc., human water systems, feedback to planetary crises from water systems and the chapter conclusions.

The authors discussed the following:

- Assigning a CLA to each section.
- To develop an outline for the chapter and present the first order draft before the next authors collaboration meeting.
- Continue engaging with CLAs from the outlook's chapters, regional chapter and the 3+1 crises chapters.
- The section on Human Water Systems will be framed around IAEGs and will link to the SDG and Pathways chapters.

### **Crosscutting Triple planetary crisis plus one issues**

The author presented how the triple planetary crisis plus land degradation will follow a cross-cutting approach through the Drivers and Pressures and State and Trends of the Environment Chapters. The author presented the outcomes of the week. The team developed a draft framework for assessing the interlinkages between crises. The author also presented the strong links with State and Trends chapters (Air, Water, Oceans, Land -AWOL-) as well as the links the chapter has with the with regional chapter (8) as well.

The authors discussed the following:

- To develop a bullet point outline for Chapter 2 that identifies the crises as pressures.
- To develop a proposed analytical framework showing the links between major crises and the sub-regions and regions in the regional chapter.
- Adding key elements specifically additional pressures that will be added to Chapter 2.
- The gaps of expertise for in the 3+1 crises.
- The authors discussed drafting the pressures text for Chapter 2 by early August.
- To draft text of the introduction on the State and Trends section, showing the interactions between crises.
- To develop metrics for the links on the regions and crises with the help of additional Fellows.

### **Chapter 7: Environmental Changes and SDGs**

The author started the presentation highlighting the outcomes of the week, the sequencing was changed from Chapter 8 to Chapter 7. The team developed the chapter outline and structure of the different sections within the chapter. The author gave an overview of the overall narrative of the chapter which will include discussions on various SDGs and the synthesis and integration of the chapter's introduction and conclusions section. The key elements of the annotated outline presented included the introduction; the next section presented was on the Environmental Implications on SDGs,

this section will have 13 sub-sections and the authors will consider clustering this section. The presentation also highlighted a section proposed on SDGs 2.0, the section will provide a narrative on the SDGs post 2030 since the GEO-7 report is to be launched in the year 2026 and the final section presented was on the conclusion chapter.

The authors discussed the following:

- To provide a narrative in the introduction section on the environmental challenges impeding the SDGs.
- The 13 SDGs covered in the chapter are focused on the social economic dimensions. The focus in this section will be on how the triple planetary crises affect the ability to achieve these SDGs.
- The Interactions (placeholder) section will cover a post 2030 future- SDGs 2.0, the section will provide an analysis on the strengths and limitations of SDGs as well as framing the priorities post 2030 for a transformative future.
- To continue work on the draft by mid-May.
- Work towards developing a zero-order draft by mid-August.

### **Chapter 8: Regional State and Trends**

The author began the presentation highlighting the proposed changes made, the regional section (the second section in the scoping document) was switched with the SDG sections (which is currently the third section). This makes the regional chapter the last of the three main sections of the State and Trends section of the report. The author continued the presentation on the week's outcomes stating that the author's team was provided with a better understanding of the chapter, its purpose and scope through various meetings with other author groups. The author mentioned that the chapter title is a work in progress and has not been finalized. The key elements of the annotated outline include introduction/chapeau, the narrative will highlight the assessment approach and links to other chapters, a section on the regions (Africa, Asia & Pacific, Eastern Europe, Latin America and Caribbean, Western Europe and Other Groups) will be highlighted, here the point of entry is to prioritize environmental issues within the region, the final section of this chapter will be on salient interlinkages between/across regions.

The author team discussed the following:

- The introduction will include a brief summary of the main issues within the region.
- The issues of scale, whether to focus on the region as a whole and/or on sub-regions.
- The section on salient interlinkages between/across regions will succinctly highlight environmental issues which have transboundary implications. It will consider important teleconnections between/amongst regions.
- The regional chapters should use the Triple Planetary Crisis +1 issues (Pollution, Biodiversity loss, and Climate change and Land degradation) as the entry point for framing the issues in each region. These cross-cutting issues can allow for an examination of the main impacts (both discrete and cumulative).
- There are several gaps in expertise that need to be filled- authors and fellows.
- Each region may wish to prioritize the impacts based on the issues of greatest importance/relevance for each of the regions (and sub-regions) given the word limit.
- The regional chapters will flow from preceding chapters in the State and Trends section.

- The regional assessments should also include information on how environmental trends are impacting regional progress towards the SDGs.

### **Chapter 9: What are the elements and levers of transformative change**

The author started the presentation with the outcomes of the week. The authors focused on the framework for conceptualizing the transformation and solution pathways and discussed the need for a clear definition of "levers" and "actions." This chapter will start with the introduction of transformation, the next section will provide a narrative on systems thinking (energy, food, circularity and environment) and how they are transformed radically. The chapter will include narrative on the actions and organizing principle of and for transformation.

The authors discussed the following:

- The concepts of terminology and levers used for solution pathways.
- The gaps in expertise and the additional need for authors and Fellows.
- The authors discussed multiple dimensions of feasibility, including issues of consent, negative and positive dynamics, and feasibility constraints for each lever.
- The levers cannot stand on their own, instead, they can interact and challenge the way they work together and how they interact with systems.
- The importance of consistency between chapters in terms of visualizations and understanding of transformations, while still acknowledging different perspectives.
- Ways to improve communication with policymakers on topics such as how to internalize externalities and phase-out fossil fuels.
- The outline will be cleaned up by mid-April and the team will meet every two weeks.
- Various calls with the Methodology author team will be scheduled as needed.

### **Chapter 10: Methodological approach to solutions-focused pathways**

The author started the presentation with the outcomes of the week on this chapter. The authors met and discussed the methodology and interacted with authors from other chapters as well as the outlooks modelers. They had iterative exchanges with the modelling group to identify ways to collaborate on the chapter. The definition of "solution pathways" was also discussed and four different definitions were proposed. The author also presented an analysis of successes and failures in policy implementation, identifying short-term demand by the public and lobbying as blockers.

The authors discussed the following:

- The definitions and frameworks of solutions pathways, transformation, actions, adopted IPBES/GSDR levers.
- Defined the 7 methodological steps.
- The Fellows should research definitions of solution pathways from other institutions and look at the solution space from IPCC while considering the complexity of the system.
- To explore climate change, including its socio-economic implications, elasticity, rebound effect and potential consequences.

The key elements of this chapter are:

- Theoretical background transformation
- Assessing policy gaps meeting internationally agreed goals
- Solution pathways and behavioural change
- Identify positive synergies and potential trade-offs, effectiveness, and efficiencies.
- Realign financial systems, internalize externalities.
- Cost of inactions vs. benefits of actions
- Review of different regions and contexts
- 7-Steps Methodology- feeding into outlook models

### **Chapter 11: Pathways for transformation of Economic Models**

The author started the presentation with the outcomes of the week on this chapter. The major outcome from this group was the aspect of the missing “Governance” and its effects on all the different levers. It was referred to as the *elephant in the room* that must be addressed to provide grounds for the analysis of the pathways on one of the most important systems. The author highlighted that the starting point of this chapter will set the scene of where we stand today, with regard to the financial and economic systems, as well as their interlinkage with other systems. The key elements in this chapter included efficiency of action levers, highlighting the potential impact of using levers actions at a global scale.

The authors discussed the following:

- The chapters title should change to ‘Pathways for transformation of Finance and Economic Models’ since Finance and Economic Models would merge.
- The need to identify what needs to be transformed and what has been done so far as case studies to find the best solution pathways for this system.
- One important step will be the analysis of the efficiency of the financial and economic systems.
- To establish a shared vision of the operational space and collaboration modality to evaluate the feasibility of the economic system request and the significance of modeling work.
- Successful case studies need to be identified and built upon to design and present solution pathways.
- Different entry points need to be analyzed and transformation solutions presented on a short, medium and long-term basis (2030, 2040, 2050)

### **Chapter 12: Energy**

The author started the presentation with the outcomes of the week on this chapter. The authors differentiated the energy transition between the global North and South, emphasizing the importance of transitioning in a way that prioritizes the needs and wellbeing of people rather than only technology and economics. The presentation highlighted case studies of different levers and interconnections to other systems. The authors participated in discussions with the policy pathway authors and completed a first draft of the chapter outline. The introduction of this chapter would include net zero energy systems emissions pathway, mitigation, adaptation for energy systems and areas to be focused for transformation. Other key elements in this chapter included current solutions in energy systems and

barriers to transformation, levers for transformative change, interdependency with the other systems defining the solution space and recommended actions to accelerate transformations. The group also identified gaps in expertise that need to be addressed.

The authors discussed the following:

- Synergies and trade-offs between mitigation and adaptation as energy systems need to be transformed.
- The need to analyze current practices in energy access and seek actions for transformation.
- Follow current and emergency solutions for transforming the energy system.
- A need to address energy poverty, reliability, and resilience of energy systems
- Explore electrification in buildings, industries, transport, and other sectors.
- Analyze battery storage and critical minerals and their role in transformation.
- How to consider alternative fuels and diversification.
- Develop a narrative that discusses land competition and trade-offs with biodiversity.
- The authors identified gaps in expertise that need to be addressed.

### **Chapter 13: Food**

The author started the presentation with the outcomes of the week on this chapter. The presentation highlighted the objectives of the chapter that were identified, and priorities for inclusions. The presentation explained the need for market power, food system structure, circular economy, resilience, and regional differences. The three primary sections in this chapter include the existing and emergent solutions in food systems and barriers that prevent systems transformation, levers for transformative change and interconnections and outcomes

The authors discussed the following:

- Details of the outline and division of roles.
- Develop a work plan to complete the first order draft.
- Brainstorm on adapting the outline to the structure agreed upon during joint sessions and workshop.
- Creation of graphics and data visualization ideas.
- The gaps in expertise and proposed names of experts to be contacted. The authors identified knowledge gaps and arranged a meeting schedule.

### **Chapter 14: Circularity**

The author started the presentation with the outcomes of the week on this chapter. The presentation outlined the key issues to include in this chapter and a possible structure including subsections. The author explained they would like to create a positive narrative that moves away from a scarcity-focused storyline. This positive narrative could include diverse worldviews and knowledge, while overcoming several barriers. There were no major gaps identified in this group, but the authors requested an addition of 1 or 2 authors.

The authors discussed the following:

- Which resources and materials should be included

- Key areas: trade, taxation, standardisation, resource scarcity
- Key value chains: construction and the built environment, electronics, textiles, plastics, food, energy infrastructure.
- Policy options including taxation, national action plans on circular economy and financial regulation should be included in this chapter.
- The introduction section should identify the key issues and elements of the current linear system and the need for transformation which includes discussing the take-make-waste model, different material needs and economic challenges.

### **Chapter 15: Environment Transformation Pathways**

The author started with a brief explanation that this group serves as an integrator for energy, materials, circularity, and food systems transformation. These systems interact with the environment and impact economic and financial transformations, which ultimately affect society. The authors agreed on an outline with the Policy Response and Solutions Pathways Group, they also discussed transformation, levers, scenarios, and modelling. The authors emphasized the need for integrated and coherent systems thinking with other chapters and started to draft out what the executive summary might look like. The key elements of this chapter include new systems thinking for environmental regulation, land-ocean based solutions for GHG mitigation and adaptation, solutions for enhanced natural capital, biodiversity, and ecosystem services, land, rivers and ocean harnessed for energy and enhanced environment and solutions for circular approaches to pollution – reduce, reuse, recover.

The authors discussed the following:

- How to enact systems thinking for environmental transformation that encompasses food, energy and materials solutions for circularity and a healthy planet.
- Interconnections with food, energy, circularity, and economy system. The Fellow will support to work on a conceptual graphic and matrix of solutions and actions for each system approach.
- To interact with the energy, food and circularity transformation authors and also the land, air, ocean and freshwater groups

### **Consolidated presentation from Outlooks group**

The representative of the Outlooks group presented the first three chapters as they were highly integrated, and the main achievements from this authors group included reaching an agreement on the overall goal and methodology, establishing a linkage to the solutions pathways and regional chapters, developing a draft model framework, and a questionnaire. The work plan for the next steps would be to finalize the model framework and develop an indicator framework first, start running the models, and then interpret the results in mid-September.

The authors discussed on the following:

- The overall goal and methodology of the Outlooks chapter.
- The link to the Solutions Pathways and Regional chapters.
- The need to develop a draft model framework and a questionnaire.
- An agreement on regions, targets and storylines.
- Workplan to develop chapter outlines and the First order draft.



Below are the key elements of annotated outlines for each chapter under the Outlooks section:

### **Chapter 16: Approaches, methodology and philosophy**

- Goal and overall approach
  - Policy questions; Why use models and scenarios for this?
- Models and scenarios
  - Method: Target space; Models and stories; baselines and pathways
  - Models: Model framework, model background, systems and indicators
  - Stories: storylines to quantify levers to change systems
- Regional similarities and differences
  - Disaggregation methodology
  - Policies, institutions and governance
- Outline of the Outlooks

### **Chapter 17: Staying on the path we are on**

- Systems: DPSIR
- Driver and pressure
  - Demographics, economy, etc.
  - Food, energy, material/waste, economy & finance
- State (Air, soil, freshwater, ocean and coast)
- Impacts
  - Climate, biodiversity, pollution and land
  - Socio-economic: Poverty, hunger, health, etc.

### **Chapter 18: Multiple pathways that achieve Environmental Sustainability**

- How can the world be transformed to achieve internationally agreed environmental goals?
- How do transformed systems look like?
- What are the synergies and trade-offs?
- What are the socioeconomic implications?

### **Chapter 19: Disaggregated Solutions Pathway Scenarios**

The author explained how Countries of different characteristics face different opportunities and challenges in their transitions. The author mentioned that they would cluster countries according to economic, environmental and resource criteria.

The authors discussed the following:

- Operating the multi-model approach is technically challenging and time consuming but promises instructive outcomes for public and private sector decision makers.
- Modelling needs to unpack the dynamics, synergies and trade-offs of the five transitions.
- Understanding the implications of the five transitions for countries confronting a different economic, environmental and resource situation is critical for tailored response to the transition needs.

- Presenting modelling results to gain attention from Government, Business, Community and Stakeholders is as important as the veracity of the modelling.

### Chapter 20: Regional Similarities and Differences

The author started the presentation with the outcomes of the week on this chapter. The outlook analysis was discussed, and its consistency with the outputs of the models and the variables used were clarified. Relevant targets for the regional chapter were identified such as human wellbeing, sustainable consumption and production, and the environment. Regional interlinkages and transboundary issues were also discussed, as well as consistency and coherence with the regional State and Trends chapter and the Policy Response and Solution Pathways chapter. The key outcomes of the meeting were a general understanding of the chapter's content and methodology, an agreement on the main CLAs for the sub-regional analysis, and contact established with the CLAs of the State and Trends chapter to ensure consistency and relevance of the storylines and selected targets based on regional priorities.

The authors discussed the following:

- To understand regional similarities and differences in terms of the impact on the triple crisis and strategies being taken to address them.
- Assessment of interlinkages will be important in addressing transboundary issues (air pollution, biodiversity, economic interdependence, etc.)
- Each regional section consists of following sub-sections:
  - Introduction
  - Regional and subregional implications of the baseline pathway
  - Regional and subregional implications of technological transformative pathway
  - Regional and subregional implications of the behavioral transformative pathway

### Chapter 21: Driving the Transformation

This author team will start drafting based on the outcomes of the policy and outlooks chapter. Therefore, the drafting of this chapter will be initiated at a later stage as agreed with the co-chairs. . Over the course of the week, the authors joined several chapter discussions with other groups as observers.

The key discussions from the authors on the annotated outline included:

- Introduction
  - Explaining the main approach e.g., policy-facing, solution-oriented
  - Added value i.e., how innovative (conceptually, methodologically)
- Pathways to future
  - What we know (State of Environment) and where we go (Trends)
  - Pathway 1: science/ technology/ markets etc.
  - Pathway 2: lifestyles/ behaviors/ cultural/ local/ ILK
- Moving towards transformations
  - Transforming the economy
  - Transforming governance
  - Transformational social contract

The meeting was adjourned at 17h00 on 17 March 2023, with thanks from the GEO-7 Co-chairs to the experts for a very productive discussion.

**Action items**

- The Secretariat will prepare an outcomes document for the meeting.
- The Secretariat will set up the call in the following two weeks and share the database for gap fillings.
- The co-chairs will review all the current annotated outline and provide comments.

### Annex 1: Participants List

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