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More than 200 experts from 82 countries gathered in Vienna from 15-19 January 2024 for the second authors meeting of the seventh Global Environment Outlook process to complete the following tasks related to the assessment process:

1. Continue the drafting of the chapters to achieve a First Order Draft (FOD) quality for peer-review, by (a) completing the drafting of text; (b) ensuring appropriate charts, graphs, maps and infographics are included; (c) improving the coherence of chapter text; (d) reducing overlap and duplication in the content; (e) addressing any gaps that have been identified; (f) ensuring that the chapter meets the word count limits; (g) finalizing the Executive Summary of each chapter; (h) incorporating Indigenous Knowledge and Local Knowledge across the chapters; (i) ensuring that climate change adaptation and behavioural, science and cultural elements are included in the FOD.
2. Enable cross-chapters discussions aimed at developing further interlinkages, adding cross-references and achieve greater coherence across the text.
3. Raise awareness about GEO-7 through a science-policy dialogue on Financing the Transition to a Circular Economy – including global and regional discussions.

On these items the meeting decided:

- Authors should to speak truth to power when drafting GEO-7, to convey honest and direct messages in the content of each chapter, providing inconvenient truths if they are based on robust, credible evidence.
- Authors should include different world views in their analysis by using multiple sources of evidence, including indigenous knowledge and local knowledge and highlight the distributional issues by looking at regional differences and gender differences.
- An additional 10% of word count will be allocated in chapters to incorporate Indigenous Knowledge and Local Knowledge into the analysis.
- Policy options or pathways should be presented in a way where technical potential is differentiated from and economic potential and from real world market potential.
- GEO-7 should provide solutions for how the world can become environmentally sustainable using the “if” and “then” approach; eg. *If you want to achieve the following, then these are your options... If you want to avoid the following, then these are your options.* This approach is consistent with being policy relevant but not policy prescriptive...
- Authors should make sure that the GEO-7 messaging communicates that “we are all in it together and we must all act” and authors must be unambiguous in their language.

- GEO-7 must discuss the evidence dispassionately, without fear or favor, objectively and at the same time show the sensitivity for regions and countries that are at different levels of economic development.
- The Climate Adaptation Task group will create a table that synthesizes the contents of climate change adaptation, that could be hosted in certain chapters across the report.
- The two regional chapters have been allocated additional word count to describe interlinkages across the regions for different environmental issues and the similarities and differences across the five regions in the outlook for the future.
- Chapter 13 proposed a new outline which focused on reordering and redefining the 7 steps methodology.
- Chapter 8 (SDGs) will include a section on telecoupling, and the authors discussed the text that would be developed for the section.
- Author teams will need to highlight the most policy relevant messages of their chapters in the Executive Summary, starting with a bolded sentence on the finding, 2 to 3 supporting sentences and ending with a qualitative confidence statement (developed as per the methodology in the Procedures Document).
- Chapter 9 will describe 'how transformation can happen' and how the levers interact to create solutions that lead to transformation.
- Authors must respect the word counts for the chapters. Being concise and focused is a priority for this assessment.
- Figures, graphs and boxes will need to be refined further in each section.
- Preliminary results from the modelling work were made available to support different chapters. More refined results from the models are expected to be available before the SOD writer's sprint in September 2024.
- Chapter 21 agreed to and finalized the outline of their chapter, currently divided into four sections.
- Authors should prioritize working on their respective chapters as their primary responsibility, with secondary attention to the task groups or forces which they are supporting.

Meeting Summary

Opening Plenary

The first day of the meeting in Vienna began with an opening plenary to welcome the participants. The opening welcome came from the GEO-7 Secretariat. Virtual live opening remarks were also provided by Inger Andersen, UNEP's Executive Director. The Director of the Austrian Environment Agency also provided remarks that were well received by the authors and UNEP's Early Warning and Assessment Division Deputy Director thanked the authors for their work towards the FOD. The GEO-7 Co-chairs then provided guidance for the work over the coming days. A presentation on the intellectual history of the Global Environment Outlook was provided by Laszlo Pinter, Professor and Head of the Environmental Sciences and Policy Department at the Central European University, from the book of the same title, available at <https://ceupress.com/search/book/global%20environment%20outlook>. Following the opening remarks, the Secretariat presented the agenda and plans and objectives for the week. Each chapter and task group / force presented the status of their chapter, highlighted anticipated challenges and outlined plans and objectives for the week in preparation of the finalizing the FOD. The presentation slides of the opening plenary are available on the [GEO Workspace](#).

Opening Remarks from the Co-chairs

The assessment co-chairs began their remarks by thanking the government of the Republic of Austria for giving GEO-7 the opportunity to hold the meeting in Vienna. They also thanked the Member States that decided to financially support the development of GEO-7 and UNEP for providing full support to the process through the GEO-7 Secretariat. Lastly, they thanked the authors in their different roles for attending the meeting and stated that the report would not have been possible without their selfless and determined participation in contributing to the development of a clear and scientifically based message to decision makers on the urgency of finding solutions to the great challenges of the triple planetary crisis together with land degradation.

They emphasized that authors have an opportunity to speak truth to power, even though power may not like hearing the truth. The report needs to speak to governments, the private sector and inform civil society that we are not going in the right direction. It is an opportunity to tell some inconvenient truths, which again, governments will not want to hear. Inconvenient truths, however, must be based on robust and credible evidence. Authors must be unambiguous in their language and must highlight the diversity of worldviews on all of these issues, while assessing the distributional and regional implications of the findings.

Authors presenting policy options or the pathways to what we believe to be environmentally sustainable will need to differentiate the technical potential from the economic potential from the world market potential. As authors assess the technical potential, the economic potential and finally the market potential, solutions may become more difficult to find because there are vested interests and barriers to implementation in government and the private sector and civil society.

When solutions are put forward, questions should be asked about “are these solutions plausible?” Believing that we can move to an environmentally sustainable world by everyone becoming a vegetarian, for example, is completely implausible.

Drivers and pressures that create climate change, loss of biodiversity land degradation and pollution are all increasing in nearly every part of the world. Governments are failing to meet any of the agreed environmental goals. Governments they can no consider these four environmental crises as independent crises - they must be managed together. The multilateral environmental agreements should also work together, as well as global assessments. Neither are working together quite as well as they could. Governments, the private sector and the public understand should understand that environmental issues are not simply environmental issues, they are economic issues, they are development issues, as well as security, social, moral and ethical issues. Because we are not addressing these environmental issues, we are undermining all of the SDG's and are not on a path to succeed in meeting any of the SDGs at the moment.

The good news is that we can become environmentally sustainable - that is a future that is achievable, but it will require a fundamental transformation of our economic, financing, energy, food, materials and environmental systems. These transformations will require overcoming difficult barriers, vested interests in both governments and in the private sector and these transformations will require looking at all of these systems together, not in silos. This means we'll need a dramatic transformation in national and international governance systems.

We must provide guidance of how to become environmentally sustainable – it is not sufficient to say to governments that we need to redirect, repurpose, eliminate environmentally damaging subsidies. We have said this for many years, but GEO-7 can answer the ‘how’ question.

GEO-7 can ask why we are failing to meet the Internationally Agreed Environmental Goals? Why are we failing on the Paris target? Why do we fail on land degradation? What are the social and political barriers, the political realities to transformation? Again, governments may not listen, but we have a duty to tell them what the science says. Authors have an opportunity to develop a hard-hitting, evidence-based assessment, along with expert judgment and pure policy relevant findings that are concise, comprehensive and solution focused. This assessment needs hard hitting chapters with really compelling executive summaries because they will be the basis of a foundation for the GEO-7 summary for policymakers.

PART A: Overview and Context

Chapter 1: Introduction

During the week of the second authors meeting, the chapter team met with different author teams to discuss synergies between their chapter and other chapters to ensure consistency. The team also met with the Indigenous Knowledge and Local Knowledge experts to discuss ways they can incorporate IK & LK within their chapter. There were also various discussions between the chapter team and the GEO-7 co-chairs, who provided guidance for various sections of the chapter.

At the end of the meeting, key messages from the revised chapter were presented. These included: humanity faces a triple linked planetary crisis (climate change, biodiversity loss, pollution of air, land and water) together with land degradation. Because of these crises, the world is not on track to achieve environmental, economic or social sustainability and therefore more ambitious actions are needed as soon as possible.

Chapter 1 will also present that GEO-7s innovations include:

- An integrated approach to the analysis of the triple planetary crisis plus land degradation and their interlinkages;
- A Solutions-based approach to implement transformative change;
- An assessment of the equal validity of plural and diverse knowledge systems;
- A description of the digitalization of the GEO process;
- An integration of behavioral, social, and cultural sciences along with natural, physical, and economic sciences

Transformative change should be implemented with an inclusive and participatory approach

Chapter 2: Historical, current and projected drivers and pressures of environmental change

While in Vienna, the authors had a chance to reflect on the subchapter elements and used their time to draft sections of the sub-chapters. There were various discussions with different chapters to discuss the interlinkages of the drivers' models. The CLA presented the key achievement which included creating a narrative conceptual flow linking pressures and drivers, leading to the planetary crisis. The text for this will be drafted by the author team to further explain the flow of the chapter. The chapter team will also hold various meetings to further refine the text and finalize the chapter ahead of the FOD deadline.

PART B: State and Trends of the Environment

Chapter 3: Air – atmosphere

Coming to the meeting, the author team needed to address how the planetary crises together with land degradation impacted on the atmosphere and on reaching the SDGs as well as other internationally agreed environmental goals.

Following several interactions and discussions with different chapter teams, the authors of Chapter 3 were able to identify three key messages from their chapter:

On climate change

- Global average temperature has continued to increase, and 2023 was the hottest year on record. This is leading to increased frequency and intensity of extreme events, e.g. heatwaves and heavy rainfall (flooding).
- Currently countries are not on track to meet the 2.0°C stabilization target by 2100 in the Paris Agreement
- Climate change increases risk to cardiovascular and respiratory systems as well as mental health, especially in aging populations

Air Pollution

- Urban air quality has improved in some regions, but certain megacities are still very polluted (e.g. in Africa).
- Wildfires and other open biomass burning ("landscape fires") have become a more dominant source of air pollution, given reductions in urban and industrial sources of air pollution.
- In 2019 90% of the global population was exposed to PM_{2.5} concentrations in exceedance of the 5 µg/m³ guideline (WHO), leading to 7 million premature annual deaths attributed to air pollution.

Stratospheric ozone

- The Montreal Protocol and its amendments have largely succeeded in reducing emissions of Ozone Depleting Substances.
- Since GEO-6, the recovery of the ozone hole has slowed because ODS emissions have not decreased as rapidly as expected.

Chapter 4: Land and Soils

The author team worked together in drafting sections of the chapter while meeting with other chapter authors to discuss coherence across the chapters and within the section. The key messages identified in the chapter included;

- Climate change is predicted to be the major future driver of terrestrial biodiversity decline, by increasing the length and severity of droughts and fires, accelerating permafrost thawing, and also impacting food production. This has enhanced the release of carbon from terrestrial ecosystems into the atmosphere and modified nutrient cycles. 25% of humanity have already experience temperature increases of more than 1.5°C in at least one season, putting at risk the Paris Agreement goals.
- Pollution and land degradation have resulted in 36 billion tons of soil being lost annually due to soil erosion, enough to fill in the Dead Sea in 5 years.

- Land Degradation Neutrality targets are not being met. Emissions of chemicals constitute the largest human impact on the Earth. While existing agreements fail to fully address existing pollution sources, new pollutants such as microplastics are growing and are largely unregulated. Chemical pollution affects the food chain and water supplies and threatens human health and biodiversity.

Land use change and degradation, intensive agriculture, and habitat loss are all accelerating biodiversity loss. The ongoing extinction of species is exemplified in a widespread reduction in insect biomass and species richness. Together, those changes are contributing to the declining capacity of land ecosystems to deliver ecosystem services essential to local communities.

Chapter 5: Oceans and Coasts

Following the different discussions in Vienna, the chapter authors identified three key messages the chapter will need to develop further. Key messages from this chapter include:

- Oceans that are increasingly degraded due to accelerating processes (climate change, pollution, biodiversity loss and land degradation).
- Oceans and coastal ecosystems are progressively threatened by environmental degradation, with some areas showing an accelerating decline.
- Changes in oceans and coasts threaten the provision of important ecosystem services with implications for human livelihoods, health, and equity.

Following discussions with the IK & LK taskforce, the authors will ensure relevant IK & LK dimensions are incorporated into the chapter.

Chapter 6: Freshwater

During the meeting the authors managed to draft various sections of the chapter. The key messages emerging from the chapter include:

- Water pollution derived from mining, agricultural, industrial, and urban sources, and land degradation is reducing the quality of available freshwater and contributing to water insecurity.
- Unsustainable global freshwater withdrawals and climate driven changes of the hydrologic cycle are contributing to physical water insecurity, extreme flood events, and drought in many areas of the world.
- Freshwater ecosystems show among the highest rates of biodiversity decline (83% of all freshwater species lost since 1970) due to pollution, invasive alien species, climate change, and overharvesting of fish.

Chapter 7: Implications of environmental change on the SDGs, and internationally agreed environmental goals

While in Vienna, the chapter authors had several cross-cutting discussions with other chapters to discuss sections of their chapter to avoid redundancy and to ensure consistency of the narrative within their chapter. The chapter team met with the IK & LK taskforce to discuss where the IK & LK issues will be highlighted and placed in their chapter. Key messages from the chapter now include:

- The planetary crises and the crossing earth system boundaries, are damaging human health and well-being and undermining the achievement of the economic and social dimensions of the SDGs.

- The Planetary crises are imposing very large economic and social costs, and the cost of not dealing with them will only escalate. Non-action will further escalate costs, especially harming vulnerable populations.
- The planetary crises are contributing to conflicts, political instability, as well as migration and refugees. A much higher prioritization of “environmental” SDGs and targets is needed to put social and economic goals and targets back on track and minimize the scale and costs of environmental damage.
- Environmental solutions need to be designed and managed to more directly contribute to economic and social goals and targets, especially jobs and decent work. (Just transition)

Chapter 8: Interlinkages across environmental changes, scales and geographic regions and sub-regions

The Chapter 8 author teams used the second authors meeting to address structural questions within the chapter and to progress writing.

The sub-chapters met with their counterparts in Chapter 20 to ensure a smooth narrative between the two chapters. Additionally, an approach to discussing telecoupling issues within the chapter was progressed.

The key messages from the chapter include:

- Climate change exacerbates local pressures related to biodiversity loss, pollution and waste, and land degradation, resulting in the reduced resilience of the vast majority of natural systems in all regions and sub-regions ranging from the cryosphere in WEOG, to agricultural systems in EE, to the tropical forests of Africa, Asia and Latin America; and the small islands located in the Pacific and the Caribbean.
- Understanding how the planetary crises together with land degradation reinforce each other to drive the persistent and pervasive negative changes in human systems at the regional and sub-regional levels is critical, since impacts are highly differentiated at these scales. There are, however, some commonalities in impacts which are noted across countries of similar socio-economic status.
- Telecoupling impacts, driven by trade, tourism, migration and foreign investments have direct impacts on natural and human systems within regions. Trade is a particularly important driver in telecoupling impacts, associated with USD 7 trillion of trade between 2017 and 2021. Although there are benefits to countries from certain forms of telecoupling, such as cases where FDI and tourism can lead to reductions in pollution or benefits to socio-economic systems, telecoupling most often results in increased levels of GHG emissions, and land degradation, with the largest impacts on developing regions.

PART C: System Transformation and Outlooks

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

During the Vienna meeting the authors drafted the chapter further following guidance from the co-chairs and the various interactions with different authors within the section to streamline the text and ensure consistency. The CLAs met with the IK & LK task forces and task groups to discuss how they can incorporate the various issues faced and how these can be highlighted further within the chapter. Key messages from the chapter included:

- There is widespread international agreement, backed by scientific evidence, that Business-As-Usual or continuous incremental improvements will not be enough to deliver on global environmental goals and that fundamental transformations of key societal systems are needed.
- There is a substantial and growing body of interdisciplinary knowledge specifically focused on system transformations, offering complementary perspectives on how societal systems have or can be transformed, in a variety of sectors and contexts.
- There is a need for strategic approaches to the transformation of systems, their interactions and interlinkages.
- Domains of intentional action (levers) provide the scope for strategic approaches to system transformation in policy and practice (who and what drives change, how is change influenced, why is it accepted).
- The levers (Economics and Finance, Individual and Collective action, Knowledge and Innovation, Governance, Capabilities) allow relevant social actors to make sense of difficulties for system transformations and generate options for transformative action.
- Combining intentional actions in multiple levers is necessary for system transformation.
- The feasibility and effectiveness of strategic efforts to support system transformations can be significantly improved if informed by guiding principles.

The proposed 6 principles developed by the author team include:

1. An explicit focus on current system configurations and sources of lock-in.
2. Jointly addressing new and existing systems, through explicit choices resolving contradictions between what has to be developed, phased out, preserved and avoided.
3. Near and long-term solutions, enabling constructive linkages between multiple temporalities and accounting for non-linear dynamics.
4. New ways of dealing with uncertainties and anticipation.
5. The involvement of actors from different societal spheres, which raises issues of coordination, inclusivity and participation.
6. Explicit acknowledgement of power relations and decisive political choices

Chapter 10: Approaches, methodology and philosophy

After the restructuring of the chapters in GEO-7, Chapter 10 now presented the methodology for the outlooks work within the assessment. The key messages from this chapter include:

The authors discussed the intended use of Outlooks Modelling Results:

- Show trends and provide context for how different systems may dynamically evolve
- Transformation pathways are stylized paradigms - not predictions or expected real worlds
- Comparing and contrasting of different pathways and their narratives helps identify the required extent of change, synergies and trade-offs, and implications for the environment and human well-being

The scenarios developed should not be used for:

- Focusing on specific numbers
- Focusing on single transformation pathway

The scenario results are not final, they are currently undergoing internal review and will be revised and expanded in time for SOD.

Chapter 11: Staying on the path we are on – global implications

Chapter 11 now focuses on the business-as-usual outlooks analysis. Key messages from the chapter included:

- A continuation of current trends in the five systems further intensifies the planetary crises thus failing to achieve globally agreed environmental goals.
- Human wellbeing is expected to improve over the long run, but far from enough to achieve related SDGs and the environmental crises will produce increasing threats to people.
- The financial damage of not addressing the planetary crises is substantial and is increasing over time.

Chapter 12: Transformation Pathways – global implications

Chapter 12 now focuses on the target-seeking scenarios analysis. Key messages from the FOD include:

- The modelled transformation pathways illustrate how achieving the environmental goals is possible but highlight the need for unprecedented and coordinated transformation across the five systems.
- The pathways vary in their consideration of the importance of social and technical assumptions (e.g. efficiency, sufficiency, etc.) and combinations of these, but all have major implications for energy, material exploitation and use and food provision systems.
- Addressing inefficient and unnecessary use of resources is critical to reduce pressures on land, energy, water, and climate systems and has benefits across the planetary crises and for human well-being.

PART D: Solutions Pathways Towards Transformation

Chapter 13: Methodological approach to solutions-focused pathways

By the end of the drafting week, chapter 13 had developed an innovative 7-step methodology to find efficient solutions pathways to transformation at a time of great need, which seamlessly links theory to practical tools for finding solutions. These were accompanied by the detailed graphics they developed to show the relationships between the seven steps and six principles of transformation. If well implemented, the methodology could uniquely improve the design of transformation policies, in terms of:

- Comprehensiveness and clarity.
- Ex-ante, ongoing, and ex-post evaluation.
- Visual tools integrate complexity.

Chapter 14: Solution pathways for transformation of economic systems

By the end of the week in Vienna, the authors revised their chapter and extracted some key messages, including:

Existing economic and financial systems have failed to deliver socio-economic and environmentally sustainable development. Therefore, to achieve transformation:

- Economic performance must be based on a different set of indicators than just GDP. E.g. 'beyond GDP'

- Approaches to economic development should use non-market, market-based mechanisms and governance to internalize externalities and repurpose environmentally harmful subsidies.
- Approaches to financing should reorient the private and public capital flow towards environmental sustainability to fill the current investment gap. Systems transformations will only be achieved through combining multiple solutions pathways to achieve the goals.

Chapter 15: Solution pathways for transformation towards circularity

By the end of the week in Vienna, chapter 15 made progress identified these key messages:

- A global shift to a circular economy is a leading solution to the triple planetary crisis together with land degradation (well established).
- A circular economy based on solutions which design out waste and maintain products, components and material stocks at highest possible value and utility for as long as possible will also contribute positively to socio-economic development (well established).
- Changing systems conditions towards circularity will enable new circular business models and value creation requires:
 - Internalizing social and environment costs to reflect the full costs of goods and service, together with compensatory mechanisms to support low-income groups
 - Establishing extended producer ownership and liability legislation
 - Ensuring full transparency about products, components and materials (through digital systems like product passports)
 - Inclusion and formalization of informal sector to create decent livelihoods
 - Shifting taxation from labour to non-renewable resources
 - Reforming trade system to eliminate waste dumping and enable trade in circular goods and services
 - Changing social practices that embrace circularity and lifestyles
 - Developing and diffusing new technologies, materials and innovations
- Circularity supports the transition of the other system pathways: energy, food, economic and finance and environmental systems

Chapter 16: Solution pathways for transformation of energy systems

During the course of the week, chapter 16 considered guidance from the BSC group, including:

- Discussions on NIMBYism, prosumerism, energy communities, and behavioral levers.
- Emphasis on citizenship, knowledge exchange, and inclusive policies for BSC perspective.
- Consideration of issues and impacts for different demographics in mitigation and adaptation.

Chapter 17: Solution pathways for transformation of food systems

During the week in Vienna, chapter 17 identified three key messages including:

- governments have a responsibility to improve governance to create the enabling condition for food system transformation that is environmentally sustainable, equitable and inclusive. This involves influencing the policies and incentives for changing the

rules of the game for companies, financial institutions, and cross ministerial decision making for food systems.

- Power imbalances in the food industry must be leveraged for good through innovative partnerships, increased accountability and shared goals.
- Listening to the farmers and consumers is critical and empowering them to make context specific decisions that are visible and strengthen the real developments and produce positive outcomes for the food systems.

Chapter 18: Solution pathways for transformation of environmental systems

During the week in Vienna, the chapter managed to define four clear goals to transform the global environmental system:

- Conservation of species and halting the loss of biodiversity
- Outlining socio-ecological systems adapted to climate change
- Restoring ecosystems for inclusive well-being
- Transitioning to a sustainable bioeconomy and rebuilding on natural capital

The chapter also managed to identify and align nine solutions pathways to achieve the above four goals, including: 1) Enhancing and protecting biodiversity, 2) Reducing ecosystem exposure to pollution, 3) Climate resilient livelihood and ecosystems, 4) Disaster and climate risk management, 5) Locally led planning, 6) Nature based solutions, 7) Sustainable use of land and ocean, 8) New and novel bio-resources, and 9) Rapid transition to bioeconomy.

Solutions pathways 1, 5 and 6 above are the most highly significant solutions pathways to achieve transformation. The chapter has additionally defined action archetypes or principles of operation to achieve the transformations over the 'short', 'medium' and 'long-term.'

PART E: Implications for Regions and Groups of Countries and Driving the Transformations

Chapter 19: Implications for different economic development context

This chapter now explores commonalities for six groups (clusters) of countries with regard to transition management, including institutional and governance aspects of the transition and transition risks. Assumptions are grounded in population density, where countries with high population density are presumed to have depleted many of their resources and thus depend on foreign resources.

Since chapter 19 follows the modelling chapters and uses the state of the modelling, this chapter is then trying to come to some intermediate conclusions:

- High-income countries must reduce their resource consumption and associated environmental impacts, maintain infrastructure, and manage waste and emissions to rapidly reduce ecological impacts.
- Middle-income industrializing and urbanizing economies can focus on opportunities that result from investments in new infrastructure to avoid accelerating pressures and impacts.
- Low-income countries will rely on technology transfer and financial support to manage the transition and establish foundations for human well-being.

Currently, the conceptual framework for chapter 19 has been revised and data analysis undertaken to support it, integration with modelling chapters has been initiated, and a section

on synergies and trade-offs between transition domains has begun. Additionally, domain experts are finalizing thematic sections, including opportunities and challenges, and science-based guidance for transition management.

Chapter 20: Regional similarities and differences

As the modelling chapters generated preliminary model results, the authors have made efforts to derive initial findings. These early findings confirm that continuing with the business-as-usual scenario is not viable, since the projections suggest severe environmental consequences and the potential failure to achieve the SDGs and other global goals and targets. Thus, the subsequent sections illustrate the various regional strategies for addressing environmental issues based on the current regional state and trends.

Africa and sub-regions

The Africa sub-chapter believes that innovative financial/economic reforms and regional trade agreements are necessary to radically transform the energy, food and material systems on the African continent.

Asia and Pacific and sub-regions

The Asia and Pacific sub-chapters' approach rely on accelerated transition to renewable energy, as this can reinvigorate low-carbon economic growth, with complementary components of the behaviour change-led scenario to transform the food and material/waste systems.

Eastern Europe and sub-regions

The Eastern European region is focusing on the implementation of the EU's Green (deal) programmes as an opportunity to help transform the energy, food and material/waste systems by putting the region and sub-regions on a low carbon development trajectory.

Latin America and Caribbean and sub-regions

For the Latin America and Caribbean regions, the technology-led scenario shows a positive trajectory complemented by behaviour change-related levers that can enhance synergy and minimize environmental damage.

Western Europe and Other Groups

The Western Europe and Other Groups' approach has to be led by ambitious and accelerated transition to a low-carbon green future, while reducing wasteful consumer behaviour, controlling biodiversity loss and pollution and transforming the global financial system.

Given that chapter 20 is among the most extensive and complex chapters of the report, the challenges ahead involve ensuring consistency, maintaining quality, and presenting a logical argument throughout the chapter. Simultaneously, the authors aim to streamline the existing draft by reorganizing the text within the agreed-upon structure. Additionally, the chapter will assess the incorporation of recently available modelling results for each region across the five systems. Other anticipated challenges for the week in Vienna shared include:

- Reaching a consensus on the quantity and type of infographics, cross-referencing, and adherence to word limits and hard deadlines
- Conducting meetings with the different task groups/forces and incorporating their input into the FOD
- Improving the FOD text in consideration of the feedback provided by the co-chairs.

- Creating a consistent and coherent chapter using the diversity of authors' experiences and skills
- Discussing and agreeing on a final Executive Summary and regional summaries defined by punchy, new, and transformational Key Messages that can become the building block of the GEO-7 SPM

The synergies and differences that exist between the regions will inform a trade-off exploration, which is ongoing, and the interlinkages between the five regions will also play a key role in how the differential trajectories could look in the future (e.g. through trade, etc., explored through the tele-coupling in chapter 8.)

Chapter 21: Driving the transformations

On the final day of the meetings in Vienna, chapter 21 reported to have refined their outline with further descriptions and details to their four sections above, although they will be further tailoring the detailed approaches based on modelling results and other chapter outcomes, such as from the solutions pathways chapters. Their outlining process so far has been able to yield the following conclusions:

- There is *no one size fits all* for transformation.
- Transformation is hindered by systemic barriers and lock-ins, which can be overcome by both human and non-human agents of change. *Nature* should be seen as an equal agent of change. Combinations of motivators can drive transformations. *Health* and *wellbeing* are universal motivators.
- Acceleration *must* be inclusive and accountable.

Other accomplishments highlighted by the chapter now include having an agreed detailed outline, having identified gaps in knowledge and resources, having approached potential CAs, having set clear tasks and targets for the chapter's CLAs and LAs, and having initiated (but not completed) liaison mapping. The chapter is currently refining the text and 'gaps' in knowledge before submitting their FOD.

Climate Change Adaptation (CCA) Task Group

Additional CCA team and chapter discussions for the week in Vienna included:

- The CCA team visited the members of chapters 14 (economic) and 17 (food) and shared their current approach and potential inputs. They agreed to joint reviews after the FOD to make detailed inputs and suggestions on these chapters. Chapter 17 (food) indicated concrete sections that CCA can work on.
- The CCA team shared documents and discussions with chapters 15 (circularity) and chapter 2 (drivers and pressures) and planned to have a joint call after the FOD submission.
- The CCA team discussed potential support and the development of more linkage with the Outlooks chapters after FOD submission. The Outlooks chapters are now planning to include a risk assessment model, which may be a potential collaboration area.
- The CCA group, in collaboration with the IK & LK and BSC groups, engaged in a brief discussion on regional scenario and adaptation narratives with the Triple Planetary Crisis group. They explored potential joint work on the synergies of risks and adaptation solutions. A consensus was reached to foster close collaboration among all task forces/groups moving forward and to explore linkages with the Outlook and Methodology chapters. Additionally, they discussed potential inputs to the methodology section.

The next steps for the CCA task group includes reviewing the key chapters FODs in order to make specific suggestions on target chapters, such as chapters 8 and 20. The conveners will then provide a folder with relevant information from literature and previous work and may try to develop some guidance on how to support the chapters and construct the adaptation key inputs. Overall, the CCA has expressed the need to identify their final objectives as a Task Group through the GEO-7 process.

Behavioural, Social and Cultural (BSC) Task Group

The BSC Task Group made great strides before Vienna by agreeing on two conveners and the above three workstreams and were therefore able to set out several goals for the week in Vienna:

- Confirm the BSC approach during a Task Group meeting on day 1
- Introduce themselves to as many chapters as possible
- Recruit BSC reviewers/advisors to ensure each chapter would be supported

The BSC Task Group met with nearly all chapters in Vienna (chapters 3-6 and 9 outstanding) to discuss how they could best provide support, and to direct the chapter teams to the BSC shared workspace and tools (such as the ZOD BSC report, the BSC review guide, and the Behavioural Science pocket guide for authors developed by Busara). Several new authors expressed an interest in joining the BSC Task Group, bringing the group total to 19 members (with 8 focal points for specific BSC topics). The BSC Task Group also met with the IK & LK, CCA and Triple Planetary crisis groups to align their collaborative efforts.

On the fifth day of the Vienna meeting, the BSC Task Group reported a successful week, having accomplished all goals they had set out for the meeting week. The BSC Task Group also started planning for the next steps, which include:

- Support various chapters based on their requests in time for the First Order Draft deadline
- Review all GEO-7 chapters during the First Order Draft review period using the BSC review guide
- Collect a list of BSC terms for the glossary
- Ensuring each chapter and report section has a BSC reviewer/advisor (workstream 2)
- Work with overall section CLAs to ensure there is a clear BSC narrative throughout the report
- Due to time, it was agreed that, although chapters are encouraged to draw on the support from the BSC Task Group as much as possible ahead of the First Order Draft deadline, the majority of BSC Task Group input will occur between the First and Second Order drafts.

Indigenous Knowledge and Local Knowledge (IL & LK) Taskforce

The IK & LK taskforce presented the importance of incorporating IK & LK in GEO-7. Previous GEOs did not incorporate IK&LK in much detail, however, the reports recognized the potential of IK&LK as a new information and knowledge source for future assessments. There is a unique perspective on human environment relationships/contrasting worldview which can support a better stewardship of the environment and support solutions focused approach of GEO-7.

The authors presented the taskforce's approach to identifying key IK&LK issues which will include in-depth discussions with CLAs. The taskforce will contribute text directly to the current drafts and provide feedback on sections that IK&LK should be discussed.

The taskforce stated their plans towards integrating IK&LK in the chapters ahead of the FOD, the authors grouped themselves in different chapters and sections to ensure the inclusion of key IK & LK issues (e.g. IK & LK perspectives, implications on IP & LC, potential contribution of IK & LK, etc.). The taskforce suggested to add placeholders to complemented by dialogues & call for contributions in different chapters and sections for the FOD where text will not have been completed.

IK&LK taskforce met with different author teams from the various sections of GEO-7 alongside the co-chairs to discuss and develop a plan of ensuring IK&LK is incorporated and reflected through the chapters.

Following several ad hoc discussions between the IK&LK taskforce and other chapters three key messages were identified by the taskforce to develop further across the chapters. They included:

- Indigenous conceptualizations of nature-society relationships and environmental issues are different from the dominant scientific discourse (including perception on root causes of change, of plausible futures, etc.).
- Weaving in and presenting alternative IK & LK perspectives into the outlooks and solutions pathways towards transformation will make them more comprehensive, just, and inclusive.
- Proposed solution pathways may have negative impacts on Indigenous peoples & local communities (do not harm principle and affirmative measures needed)

The taskforce planned to discuss the overall agreement with co-chairs on IK & LK narrative and key issues for the overall GEO-7 and per section/chapter. The taskforce agreed to engage and have further discussion with section and chapter authors after Vienna on weaving of IK & LK into the texts. The taskforce will insert placeholders in each of the agreed chapters, with draft text in a few chapters. Additional/revised text including key messages for Executive Summaries based on IK & LK dialogues (March and May 2024) will be added and call for contributions on IK & LK is planned for June 2024.

Triple Planetary Crisis Task group

The authors discussed the different chapters they managed to interact with while in Vienna, for Chapter 1, the authors developed a box that defines the crises. In chapter 2, section 2.5, the authors identified the interlinkages between the drivers and pressures plus crisis. The authors also identified the interlinkages between crisis and developed figures for chapters 3-7.

The author explained where the planetary crisis groups fit and can provide text and boxes which will be developed as a chapeau to ensure continuity and flow within the chapters. The group developed impacts of scenarios and a conceptual figure which the author would like to push as a theme across chapters 3-7. Three key items of progress include the three crises within the chapters and chapters that the chapeau group will coordinate with.

The closing plenary presentations from all chapters and the task groups and force can be found here on the [GEO Workspace](#).

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