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Outcomes Document

Second GEO-7 Solutions Pathways and Outlooks Workshop

4 – 7 September 2023

**Citic Pacific Zhujiajiao Jinjiang Hotel
No.666, Zhuzhu Road, Zhujiajiao Town
Shanghai
China**

[CITIC Pacific Zhujiajiao Jin Jiang Hotel Shanghai - Official Website \(hotelsofshanghai.com\)](http://hotelsofshanghai.com)

Agenda items included:

1. Move the Policy chapters towards zero order draft quality, by:
 - Improving coherence of chapter text
 - Reducing overlap and duplication in content
 - Ensuring sufficiently well-developed solutions pathways
 - Addressing any gaps that are noted.
2. Continue the drafting of the Outlooks chapters towards zero-order draft quality, including:
 - Detailing the modelling approach and any preliminary results
 - Ensuring a good link with the solutions pathways in the policy chapters
 - Detailing what the peer reviewed literature says about outlooks for the five UN regions.
3. Facilitate dialogue and collaboration between international assessment experts and Chinese policymakers to address environmental challenges on a global scale.
4. Raise the awareness of the GEO-7 process in China and attract media focus on key environmental issues.

On these agenda items the team agreed:

- On a comparable approach, through a common structure for the system chapters annotated outline, for how the solution pathways are presented (Annex 2).
- On the need for cascading definitions for solutions and solutions pathways. Solutions are the way to achieve goals. Multiple solutions can contribute to achieving one's goals while solutions pathways are a collection (or set) of interconnected and co-evolving actions with a defined sequence and timeline that through continuous interaction with external factors/context leads to a self-sustaining momentum and to the achievement of a transformational goal.
- On developing a sketch of narrative for each solution pathway in each system chapter.
- On the use of the Goals, Solutions, Levers (GSL) Tool (formerly the spaghetti diagram) to think through the solutions pathways and the various actions to be taken for each system.
- On the 7 principles for transformation presented in chapter 9, that will provide a background for thinking through the intentionality of the transformation approach for the various system and outlooks chapters.
- That establishing the 'Goals' for each system transformation should be the first step in the 7-step methodology, for developing solutions pathways and that some of the core goals should be those that solve the planetary crises.
- On ensuring that the solutions pathways are illustrative but not policy prescriptive.

- On the definition of levers as – ‘domains of societal influence which share a configuration of a broad type of actors, actions and analysis’.
- That each system chapter agrees on the goals for their solutions pathways as well as the authors to lead the drafting for each solutions pathway.
- The qualitative modelling and schematic narratives can be used as a reference to foster deeper and broader analyses in the Solutions Pathways and Regional Chapters
- On the use of the word *narrative* instead of *storyline*.
- On naming of the two pathways “technology focused transformation pathway” and “behaviour-focused transformation pathway”.
- On putting a short ‘approach’ paragraph for Chapters 19 and 20 in Chapter 16. Chapter 16 will also explain the aggregation of the model results to the country groupings and regions.
- On mirroring Chapters 17 and 18 outlines where possible/relevant, with authors drafting similar sections (e.g. food, air, well-being) in both Chapters.
- On using results from existing modelling studies for the ZOD. First full scenario results should be ready by late November to be included in the FOD.
- On the use of SSP2 as BAU scenario for Chapter 17 (BAU without policy commitments) and use boxes to show BAU scenarios with policy commitments from the literature (UNEP GAP for example), where available
- On changing the name of Chapter 18 to “Transformation Pathways – global implications” (to be proposed to the IMAG for approval).
- On changing the name of Chapter 19 to “Implications for different economic development context” (to be proposed to the IMAG for approval).
- On aggregating the modelled data to the country groupings used in Chapter 19 to the extent possible.
- On using national model applications as country-illustrations (boxes) in Chapter 20 (Brazil, Southern Africa, India and China).
- On providing Chapter 20 access to the scenario database once it is set-up and data is uploaded.
- On aggregating the modelled data to the 5 UN regions of Chapter 20 to the extent possible.
- On a new common structure for Chapter 20.
- On incorporating both solutions pathways and outlooks chapters results in Chapter 20 for addressing the region specific challenges.
- On identifying new authors to fill in gaps that were identified during the meeting, specifically for Chapter 20, where subregional expertise for WEOG is missing.

Meeting Summary

Opening plenary and parallel Solutions Pathways and Outlooks sessions

The first day started with an opening plenary to welcome the participants. The meeting began with opening remarks from the Deputy Director of the Executive Committee of the Yangtze River Delta Integrated Development Demonstration Zone, Deputy Director of the People’s Government of Qingpu District of Shanghai Municipality, Dean of the UNEP-Tongji Institute of Environment for Sustainable Development, Executive Vice Dean of Yangtze River Delta Institute for Sustainable Development, the co-chairs of the assessment, a video message from UNEP’s Deputy Executive Director, Elizabeth Mrema and representatives from the GEO Secretariat.

After the opening remarks, each chapter presented on the status of their chapter and

highlighted their key goals for the meeting. The Secretariat reminded authors that all slides will be added on the GEO workspace which are available [here](#).

The participants then split into three groups for parallel discussions.

The policy responses and solutions pathways Chapters 9 to 15 met to further discuss the development of the solutions pathways and the structure of the chapters.

The session began with a presentation titled “What is a transformation pathway and how to develop one” by the Head of GEO. The presentation highlighted how the key element of this new GEO-7 is the ‘how’ to transform the key systems and provided an overview of the tools for developing the solutions pathways, that should be used by all the systems chapters (11 to 15). The “Goals, Solutions, Levers” (GSL) diagram as well as an additional excel tool were presented and templates provided to guide the authors, together with some guidance. The focus of the goals is environmental goals to solve the 3+1 planetary crisis. The group agreed to make use of those tools when drafting their chapters by providing clear guidance for policymakers without being prescriptive.

Chapter 20 started a discussion on how to improve the structure of the chapter and developing a plan to produce the Zero Order Draft (ZOD).

Chapters 16, 17, 18 and 19 met for a general update and planning in regard to the modelling work and the development of the narratives. They also further discussed how to organize their work for the rest of the meeting.

Chapter parallel planning sessions

The groups broke off into different rooms and continued brainstorming and drafting their various chapters. 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. A summary of the parallel sessions is presented below.

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

The authors had a quick discussion on the introduction section and made an agreement on it and then started the session jointly with chapter 10. The authors agreed that ‘how to transform’ should be the main part in chapter 9 and restructured the section with seven principles including system scale, depth and scope; some things in, some things out; temporalities of transformative change; Policy mixes and multi-actor governance; plurality and uncertainty; new skills and policy intelligence; politics of transformation. These seven principles were presented to the whole authors’ team and were agreed on to be included in the current draft.

For chapter 9 discussions, the authors focused a lot on the levers since all the system chapters are using levers with different understanding. The key elements from the levers discussion include the below:

- The authors agreed that the definition of levers in chapter 9 should be ‘lever as a domain of societal influence which shares a configuration of a broad type of actors, actions and analysis’.
- The authors agreed to provide a structure for systematic discussion of levers in following sub-sections including the overall domain of intentional action, sub-areas of

action, key actors, general types, variety of perspectives, relation between levers-action-political instruments, etc.

- The authors agreed to define the ordering principle for the levers.

Moving forward, the team agreed to clean up the duplications from the current version and simplifying and shortening the document. Some new ideas from the Shanghai meeting will be listed as bullet points and developed when moving towards the first order draft.

Chapter 10: Methodological approach to solutions-focused pathways

The authors started the session jointly with chapter 9 and discussed key elements of the two chapters. The authors brainstormed around transformative goals vs environmental goals and decided that they would speak to the system chapters to further determine this.

The joint session achieved the following; agreed on the seven principles of transformation; agreed on the need to harmonize chapter 9 and chapter with regards to the 7 principles of transformation covered in chapter 9 and the 7 steps methodology covered in chapter 10 as well as with the GSL tool and the X-Curve; agreed to generate consistency between different functions of GEO-7-solutions: analytical (theory), strategic (methodology) and narrative (systems chapters) by fine tuning the relationship and content for each of those functions and agreed on the definition of levers as provided by chapter 9.

For chapter 10 discussions, the key elements from the discussion include the below:

- The authors agreed that they will include global south perspectives in the narrative of the chapter.
- The authors discussed the figures in the chapter and agreed to include definitions for the various terms in the interplay figure as well as have two X curves in the chapter.
- The authors discussed the need to include the decision-making process in the 7 steps methodology and to also refer to the 7 principles from chapter 9 in chapter 10.

Lastly, the authors met with the outlooks teams and some system chapters to ensure alignment.

Chapter 11: Pathways for transformation of economic models

The chapter authors discussed two goals for the chapter, which are; a) Re-orienting Capital Flow towards Environmental Sustainability and, b) Pricing for Environmental Cost and Benefits

- 5 sub goals were identified for each of the 2 goals and these are indicated below.
 - Re orienting capital flow towards environmental sustainability: Increasing New Financial Products (Stocks and Bonds) for Environmental Benefit, Supporting New Technologies & disruptive Innovations, Manage Financial Risks stemming from Environmental Issues, Common Taxonomy & Benchmarks and Fostering Transparency and Long Termism
 - Pricing for Environmental Cost and Benefits: Promoting a holistic & inclusive approach to environmental sustainability, Implementing Circularity, Internalizing the externalities, Greening the National Budget and Fostering Transparency and Long Termism
- Identified some actions such as realignment of subsidies, tax reform, scale up market for green/blue bonds, NBS and innovative Public and Private Solutions.
Lastly, The authors agreed to writing assignments for each of the goals and the various sections

The chapter selected 4 solutions pathways to achieve transformative change:

1. Internalizing the externalities

2. Green financing
3. Fostering non-pricing approaches for green behaviours
4. Mainstreaming circularity

Chapter 12: Energy system transformation pathways

The authors discussed the GSL chart to align their work and made updates to the chart to agree on the goals.

Goals for Energy Chapter (3+2)

- Provide affordable energy for all.
- Decarbonize everything, everywhere.
- Provide energy end-use services as efficiently as possible.
- Achieve equity in the implementation of energy solutions.
- Achieve land degradation neutrality in energy transformations.

Additionally, the authors met with other systems chapters to discuss cross-cutting issues and interlinkages.

Chapter 13: Food system transformation pathways

The authors discussed the GSL diagram to reach an agreement on the goals and solutions pathways. A plan for the delivery of the ZOD order draft and a division of work was also agreed upon. In addition, the chapter team had time to meet with authors from other chapters to discuss some cross-chapter issues and explore options for synergy.

Some key points from the meetings are listed below:

- The goals were defined and quantified.
- The issue of where to include social justice was discussed and it was agreed that it should be a goal in itself so that there will be specific text on the topic. However, it was also agreed that mentions to social justice and gender will be present throughout the chapter and the report.
- Each lever and solution was discussed and a final list was agreed.
- The flow of the text was discussed and the decision of a common structure of the solutions pathways chapter was agreed.
- A flow diagram was created to help structure the chapter.

Chapter 14: Circularity transformation pathways

The authors redefined and refined the goals, solutions and solutions pathways for the chapter. The authors also found time to meet with other chapters to discuss interlinkages across the systems. These discussions and refinements produced an updated GSL chart and excel tool to develop the solutions pathways for the chapter. The authors reflected on the 'technology', 'resources' and 'consumption' narratives and modelling and discussed the scope and objectives of circularity transformations (beyond zero waste), as well as the need to enhance the linkage to economics and governance.

The authors produced a draft graph to show that circularity is more than waste management which highlights the below points in an 'X-curve' that starts at negative environmental and social impacts and ends with positive contributions to natural and human systems.

1. Near zero-waste, designing for zero-waste dealing with legacy waste and current waste and pollution.

2. Maintaining material stocks, value retention of products, components and materials.
3. Restorative and regenerative practices with nature-positive solutions to rebuild natural capital.

Moving forward, the chapter team plans to align goals and timelines to explore and enhance interlinkages with other systems (for example energy system critical raw materials, PV waste, biogas) and the chapter on economies, and identify two case studies. Further alignment is also needed with the chapter on modelling to include the resource aspect.

Chapter 15: Environmental systems transformation pathways

The authors discussed the GSL chart and agreed on the goals and solutions in the first day, then finished the levers in the second day's discussions. The chapter team reviewed the definitions for terms in the chapter, agreeing to work in the glossary tool on key definitions, including one for ecosystem restoration.

The goals for the solutions pathways in the chapter include restoration, adaptation, conservation and bioeconomy and are listed in detail below:

- Restoring (preventing, halting and reversing) ecosystems to deliver enhanced benefits to nature and people
- Achieving transformative adaptation of socio-ecological systems to climate change
- The conservation of species and reduced biodiversity loss
- Ensuring the sustainable bioeconomy enabling future transformative solutions and rebuilding of natural capital

The authors were each assigned a goal and discussed with advice from Head of GEO on how to work collaboratively in an outline that covers each goal to explain the solutions pathways. The agreed outline will first introduce the goals while touching on barriers to reaching those goals, then introduce the solutions pathways by listing solutions for each goal and describing the collection of levers that would support the solutions. The outline then covers in more detail the combinations of solutions including any relevant case studies and finally wrapping up with synergies, trade-offs and a very short concluding messages section. In addition to the outline, the authors considered a conceptual diagram and figures for the chapter.

Chapter 16, 17, 18 and 19: Outlooks

The authors as a group discussed the outlines for Chapters 17, 18 and 19 to strengthen the structure in preparation for the internal review and drafting. The authors also assigned writing tasks for Chapters 17, 18 and 19; started drafting zero-order drafts Chapters 17, 18 and 19 and discussed chapter interlinkages and responsibilities with other Chapters.

Additionally, throughout the workshop, the authors:

- Started discussion on implications of Chapter restructuring for the Outlooks Chapters (needs continuation).
- Discussed modelling, including interdependencies and first results and developed a planning towards the FOD.
- Discussed regional model contributions for Chapter 20.
- Coded and summarized workshop results.
- Explained and discussed modelling dynamics and potential outcomes with Chapter 20 regional authors.

- Discussed how to use the outcomes from the narrative workshops to update the narratives and decided that this will be done for the FOD.
- Agreed on adding the narratives in Chapter 18 and the method for developing the narratives in Chapter 16.

Chapter 19

The authors met jointly with chapter 16, 17 and 18 as well as conducted separate sessions only focused on chapter 19 and advanced the draft. At the end of the meeting, the authors present in Shanghai collated all their contribution on the workspace so that the two CLAs that were working online could work on the updated text to prepare the ZOD.

Key issues discussed included:

- The narratives to be included.
- How to strengthen the outline.
- Including a SWOT (Strength, Weaknesses, Opportunities and Threats) approach to the analysis to shape the writing team thinking, which will be included in the ZOD.
- Discussed the chapter links with other Outlooks Chapters.

Chapter 20: Regional similarities and differences

The authors participated in joint discussions as well as group discussion per regions to restructure the chapter in order to be ready for the ZOD. The new structure was agreed by all authors who then work on identifying key issues related to their region for each section and started drafting based on the new guidance. The regional teams also had an opportunity to discuss with the modelers, who provided some clarity on the timeline for the modelling results, the timeframes and variables.

Some key issues discussed included:

- Word count: 5,000 words for each subchapter
- Need for additional authors to fill in gaps of expertise in some specific regions, including the WEOG and LAC regions.
- The timeframe of the analysis will be to 2050, as it was clarified with the modelers.
- A new structure was agreed and the text was adapted to prepare the ZOD.
- Based on the new structure, each regional team chose variables from the model to help guide the narrative to explain the evolution of the systems and the implications on socio-economics and the environmental system.
- The group agreed on variables from the model to help structure the story of the pathways for each region. Those were then discussed with the modelers, who provided their comments.
- It was agreed to use Chapter 17 as the starting point for the BAU analysis.
- Modalities for future virtual meetings were agreed. The whole chapter 20 will meet once a month and each region is expected to also meet on a monthly basis.
- The initial results from the modelling exercise will be available in November-December.

Narratives workshops

Workshops were hosted in parallel to the chapter discussions where combinations of experts from different chapters were invited to participate in a short session for an expert from the outlooks team to engage authors on the narratives to support the modelling work. The goals for the workshops were to:

1. Discuss, validate and improve the narratives, verifying the coherence for the different chapters. Focus on aspects of the narratives which don't affect the modelling protocol.

2. Foster the discussion about how narratives will be useful for the chapters.

The authors were divided in five different groups, each of them including at least one regional subchapter from Chapter 20 and one of the solutions pathways chapter. The workshop included an activity where the narratives were discussed and suggestions were provided by post-its and comments to the group. The moderators collected the results and will be providing an updated table of the narratives and key takeaways from the workshops will be circulated.

Closing Plenary

The workshop ended with presentations by chapter teams including next steps, then a wrap-up and closing remarks from the Head of GEO. The chapter update presentations are available [here](#) and all authors were grateful for the opportunity to collaborate in person to advance the drafts for the internal review. UNEP also expressed gratitude to the various hosts of the meeting acknowledging their invaluable support in making the meeting a success.

Science-Policy expert dialogues for energy, food, Materials/waste and environmental systems

The science-policy expert dialogues were initiated with opening remarks from dignitaries including a representative from the Shanghai Municipal Government, the Director of UNEP's Economy and Industry Division, Susan Gardner, a representative from Tongji University, a representative from GEO-7 Co-chairs, the UNEP's Early Warning and Assessment Division, Jian Liu as well as representatives from various Ministries (of Education, Ecology and Environment, Science and Technology, Commerce, National Development and Reform commission) in China.

The opening remarks were followed by two keynote speeches, one from an Academician of the Chinese Academy of Engineering on digital tracking of urban carbon neutrality and the second from UNEP's Head of the Global Environment Outlook on transforming key systems to reduce degradation.

The dialogues were conducted in parallel covering each of the systems with authors from each chapter participating in a panel with one expert from the outlooks chapters and local expert representatives from various Ministries. Local experts were also part of the audience.

Annex 1: Participants List**CO-CHAIRS**

Prof.	Edgar	E. Gutierrez-Espeleta	Costa Rica
Prof.	Ying	Wang	China

IN-PERSON Participants

Dr	Ghassem	Asrar	United States
Dr	Fang	Yu	China
Dr	Monica	Kerretts	Kenya
Mr	Christian	Loewe	Germany
Dr	Bruno	Turnheim	France
Mrs	Leila	Devia	Argentina
Dr	Thang	Nguyen Trung	Vietnam
Dr	Parfait M	Eloundou-Enyegue	Cameroon
Dr	Karachepone	Ninan	India
Dr	Henri	Rueff	Switzerland
Dr	Annamaria	Lammel	France
Ms	Julia	Hammann	Germany
Dr	Pierre	Failler	France
Dr	Jianhua	Xu	China
Ms	Adina	Relicovschi	Romania
Dr	Ronaldo	SEROA DA MOTTA	Brazil
Dr	Kevin Nnanye	Nwaigwe	Nigeria
Dr	Peter	King	Australia
Ms	Maria Virginia	Vilarino	Argentina
Dr	Sybil	Derrible	United States
Dr	Alice	Odingo	Kenya
Dr	Peter	Alexander	United Kingdom
Dr	Tek	Sapkota	Nepal
Miss	Katie	Noble	United Kingdom
Dr	Patrick	Schroeder	New Zealand
Ms	Apoorva	Arya	India
Dr	Xianlai	Zeng	China
Ms.	Arthur	Silva	Brazil
Dr	Binaya Raj	Shivakoti	Nepal
Dr	Gail	Taylor	United Kingdom
Dr	Adolf	Acquaye	Ghana
Dr	Alex	Godoy-Faundez	Chile
Mr.	Soham	Vaidya	India
Dr	Detlef	van Vuuren	Netherlands
Mr	Paul	Lucas	Netherlands
Dr	Mariana	Gutierrez-Paz	Brazil
Dr	Alaa	Al Khourdajie	United Kingdom
Dr	Shinichiro	Fujimori	Japan
Ms	Taylor	Hanna	United States
Dr	Claudio	Belis	Italy
Dr	Kejun	Jiang	China
Dr	Ana Paula	Dutra de Aguiar	Brazil
Dr	Pankaj	Kumar	India
Dr	Estee	Miltz	South Africa

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Dr	Rachid	Mrabet	Morocco
Ms	Monday	Businge	Uganda
Dr	Gensuo	JIA	China
Dr	Fangxia	Shen	China
Dr	Meena	Bohara	Nepal
Dr	Hancheng	Dai	China
Dr	Kalpana	Chaudhari	India
Dr	Sanchit	Saran Agarwal	India
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Dr	Judit	Olah	Hungary
Dr	Aiste	Balzekiene	Lithuania
Dr	Steven	Arquitt	United States
Dr	Michele	Fontefrancesco	Italy
Dr	Amy	Molotoks	UK
Dr	Simone	Lucatello	Mexico

Online Participants

Dr	Debora	Ley	Mexico
Dr	Nkechi Srodah	Owoo	Ghana
Dr	Sigrid	Kusch-Brandt	Germany
Dr	Svetlana	Radionova	Russia
Dr	Elisabeth	Gilmore	Canada
Miss	Alma	Mendoza	Mexico
Dr	Emmanuelle Soares	de Carvalho Freitas	Brazil
Dr	Heinz	Schandl	Australia
Dr	Lynette	Cheah	Singapore
Mr	Claude	Mbarga Ella	Cameroon
Dr	Vladimir	Dekhnich	Kazakhstan

UNEP SECRETARIAT

Ms.	Susan	Gardner
Mr.	Jian	Liu
Mr.	Pierre	Boileau
Ms.	Adele	Roccatto
Ms.	Rachel	Kosse
Ms.	Yunting	Duan
Mr.	Matthew	Billot
Ms.	Caroline	Mureithi
Ms.	Nada	Matta
Ms.	Caroline	Kaimuru
Mr.	Feng	Wang

Annex 2: Agreed structure for the Solutions Pathways chapters (11 to 15)

11 **XXX** System Transformation Pathways

Executive Summary [<1000 words]

[To be written after the chapter is complete and final]

Confidence statements only in Exec Summary

11.1 Introduction/context (description of the goals to be reached) [1000]

[describe the system and existing problems in the system, to transform the system we need to reach high-level goals, and how they are likely to achieve the necessary transformation]

11.2 Solutions to achieve transformative change [10000 words] (2000 words for each pathway)]

Solutions to achieve the goals, not a one to one match between solutions and goals (solutions contribute to multiple goals, combined solutions)

Combination of five levers part of the solution pathways (as described in chapter 9):
governance, individual and collective action, economics and finance, science and technology, capacity building]

11.2.1 Solution pathway 1

[describe collection of actions, sequencing of actions and appropriate actors to implement the actions]

11.2.2 Solution pathway 2

11.2.3 Solution pathway 3

11.2.4 Solution pathway 4

11.2.5 Solution pathway 5

11.3 Combinations of Solutions to achieve desired goals [2,000 words]

Number of goals does not need to match number of solutions pathways

11.3.1 Goal 1

11.3.2 Goal 2

11.3.3 Goal 3

11.4 Solutions case studies (country and solution specific examples – integrated across food system) [1000 words (500 words each)]

11.4.1 Case study 1

[describe real-world case study that highlights the achievement of a particular solution or goal. Explain how it could be scaled up to achieve global results]

11.4.2 Case study 2

11.5 Synergies/trade-offs interactions with other four systems [1000 words]

[describe the transformed system and what synergies there are with other systems]

11.6 Conclusions [500 words]