United Nations Environment Programme

International Science Council

UNEP foresight trajectory: **Methodological approach, rationale and process**

This document provides a summary of key steps and a rationale for the approach and decisions taken to inform UNEP's strategic foresight uplift and the activities carried out in support of the 2023-2024 foresight process. It should be considered draft and will be further refined. The general design and the specific tools and methods used for the collection and analysis of foresight data are explained in Section II. This includes the approach for the development and use of scenarios, horizon scanning and the process of developing regional workshops to contextualise and feed reflections and insights on near-term and long-term disruptions to human wellbeing and planetary health. The foresight process has been developed with the International Science Council, and in consultation with an internal UNEP Task Team, independent Foresight Expert Panel[1] and the support of several regional partners including the EU Policy Lab at the European Commission's Joint Research Centre (JRC).

I. Background and context

1.   The United Nations Environment Programme (UNEP) is putting in place an institutionalised approach to strategic foresight and horizon scanning with a view to developing an anticipatory and future-oriented culture, and to help navigate current and future uncertainty to strengthen the delivery of its work.

2.   The current process of UNEP's foresight approach started in late 2021 with a concept paper developed with researchers from the Finland Futures Research Centre at the University of Turku, in the context of an internal foresight workshop and Futures Literacy Lab: *Reimagining UNEP, towards year 2072.*[2] Following that, a UNEP Steering Committee, made up of a subset of senior leadership, and an interdivisional Task Team were set up to advance three mutually reinforcing workstreams:

   i.   Building internal capacity and capabilities for applying foresight.
   ii.   Applying foresight and horizon scanning (short-term and long-term future perspectives) to inform strategic planning as an organisation.
   iii.   Codifying UNEP's approach, methodology and mutually agreed Strategic Foresight function.

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[1] The 22-member Independent *Foresight Expert Panel* was established in March 2023, through an ISC-led nomination process

[2] *Reimagining UNEP, towards year 2072;* representing 100th anniversary of the 1972 Stockholm Conference.

II. Methods and process

3.   The foresight and environmental horizon scanning exercise at UNEP builds on current perspectives and research and incorporates relevant practices from different disciplines and applications. In parallel, a literature review and comparative analysis of different methods and tools was undertaken in collaboration with the International Science Council (ISC), scheduled for completion in July 2024, and will be published alongside the Global Foresight Report (See Sullivan et al. *in* ISC 2024). The review provides an overview of existing tools and methods on horizon scanning and foresight, the contexts of their applications and their strengths and weaknesses. The review of the scientific and grey literature was complemented by interviews with academics and foresight practitioners. Progressing and testing aspects of a foresight exercise, while also completing an in-depth review, will allow UNEP to develop a bespoke approach for its unique context.

4.   There is wide agreement in the literature that the most suitable foresight approaches, methods and techniques employed are subject to contextual and content issues ('t Klooster *et al.* 2024; APF 2022; Hines *et al.* 2019; Cuhls *et al.* 2020; Sutherland and Woodroof 2009. Nicolini and Bagni, 2014. Mukherjee *et al.* 2015). Thus, approaches must be tailored and adaptive. There are, however, critical elements and methodological choices that characterise and influence the robustness of any given foresight process. For example, the nature and type of knowledge input from a variety of credible sources is critical to the success and legitimacy of all foresight and horizon scanning exercises (Krishnan 2022; Hines *et al.* 2018; Miller *et al.* 2013). All horizon scanning processes involve iterative cycles of continuous or periodic scanning, identification and interpretation of issues and signals of change, which are analysed, distilled and adjusted using predefined framings, and collective sensemaking or structured debate (see Annex 1 and Fig 2). To be effective, foresight and horizon scanning are typically carried out in the context of a process that facilitates the downstream use of outputs (Pereira *et al.* 2021a; Störmer *et al.* 2020; Amanatidou *et al.* 2012). Given the context of global uncertainty, this foresight exercise will help inform UNEP's strategic planning, and provide input to the 2024 UN Summit of the Future.

5.   The foresight exercise began with an exploratory horizon scanning of 'emerging changes' using a classic Delphi method (Melander 2018; Mukherjee *et al.* 2015; Linstone and Turoff 1975), with a survey administered to key audiences using a semi-curated approach. This was followed by an exploratory analysis to identify structures within the survey data in terms of key themes (epicentres), clusters of emerging change and weak (or early) signals of change—potentially important / disruptive developments. A scenario-building exercise early in the process (April-June 2023) provided a set of contrasting plausible future narratives to aid the testing and sensemaking of signals identified through the survey.
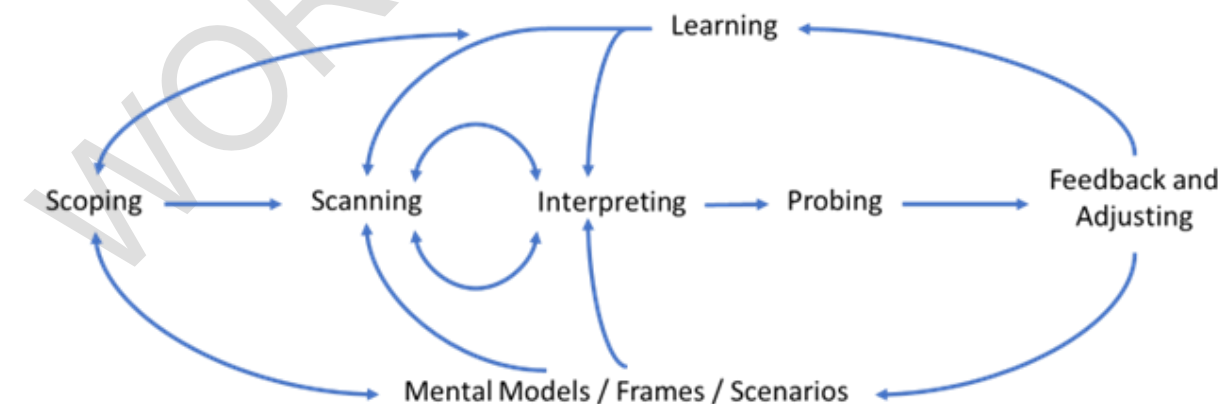

Figure 1: Conceptual model of an iterative foresight horizon scanning process *(Source: Adapted from Bengston 2013; and Bengston 2019) – **See Annex 1** for detailed schematic of sequential steps in the UNEP foresight exercise.

6.   The first **Global Sensemaking Workshop** with the Foresight Expert Panel took place 21-22 September 2023. Through a facilitated process, the Expert Panel was invited to review, scrutinise and debate the initial clustering analysis of outputs and information collected through the Horizon Scanning survey. The aim of the sensemaking process was to identify strengths, gaps, biases and linkages and to provide guidance on the way forward, including whether further interviews and consultations on key emerging areas were required. Specifically, the Panel worked through a structured debate to:

   a. Review, adjust and prioritise the initial analysis of emerging changes and associated signals of change.
   b. Identify and minimise the risk of group, representative and/or individual bias in the survey results.
   c. Identify important developments and phenomena and potential overarching themes through charting dynamics and relationships between and across Emerging Changes.
   d. Discuss the Emerging Changes through a set of qualitative scenarios about the future (2050) to explore how signals might unfold under different conditions of uncertainty.
   e. Identify novelty and potential for disruption– both positive and negative – about the state of the environment and planetary health.
   f. Create a shared understanding of next steps.

7.   The outcomes of the global sensemaking resulted in a refinement of the clustering of the Delphi survey data and an initial analysis of the significance of the signals identified. The Panel discussed, sorted, integrated, and further refined the resulting analysis and provided provisional interpretations of the proposed clusters so that an agreeable consensus was constructed. The Panel decided to rename some of the epicentres to better convey the content of the thematic areas of their respective emerging changes.

8.   The second phase in the Delphi process (January to April 2024) consisted of targeted interviews and consultations on specific issues or themes that emerged from the initial intelligence gathering, analysis and sensemaking and second Delphi Survey. These inputs were be drawn from a subset of respondents who participated in the survey during Phase One and who consented to participate in Phase Two as well as participants to the regional workshops.

9.   The foresight exercise was recursive, using data collected through classic Delphi methods, using scenarios to plot plausible futures from those data. More than one scenario exercise was needed to fully utilise the collected data, and further refine of those data through sensemaking workshops. As with most robust and impactful foresight exercises (ISC 2024; Burt *et al*. 2020; Bengston *et al*. 2019), this is not a fixed, time-bound process but one of continual iteration (see Fig. 1).

2.1 Developing and using scenarios

10.   Scenario building is the process of developing narratives of 'alternative futures' or storylines that conceptualise what the future may hold under different conditions and assumptions (Pereira *et al*. 2021a). They intend to capture, in broad terms, the realm of possible developments that may be faced when addressing the environment as the future unfolds (Pereira *et al*. 2021b; Melander 2018; Fuller 2017).

11.   The scenarios are contextual, and they explore the future of human wellbeing and planetary health through the lens of the environment-development nexus, incorporating a series of relevant environmental, socio-political, economic and technological factors. They are not intended to describe strategic actions or potential interventions, rather to build on key trends and critical uncertainties that could drive significant disruption, to describe potential future contexts. These scenarios, from a current starting point (2023) to a time horizon of 2050, present information about the process of change. This provides a backdrop of what future issues (e.g., acute shocks and stressors) we may confront, allowing for the optimisation of strategies and strategic planning.

12.   The scenarios are not intended to serve as a set of predictions, but rather a qualitative description of possibilities (plausible futures) and aid the characterisation of the potential impacts of current trends into the future, and key areas of uncertainty. The divergence of scenario narratives is structured to cover the different ways key uncertainties may unfold over the defined period, from the present up to 2050 (see **Annex 3**).

13.   The individual scenario storylines created in the context of this exercise are qualitative models differentiated by the way a multitude of factors may interact over time. Adding quantitative elements to the narratives or combining these with quantitative modelling is possible for further use and expansion of the scenario analysis and may be incorporated within the UNEP Foresight Trajectory. This is, however, not currently planned. Similarly, additional steps could be taken towards the development of a robust set of scenarios that can inform national and regional action including institutional responses and future systemic transitions. This application would require the engagement of a broader set of actors, including the private sector, civil society, foresight experts and a multi-stakeholder reference group.

14.   UNEP, together with an external service provider, Prospex bv/ DeRuijter Strategy, convened a select group of 18 multidisciplinary technical and programmatic UNEP staff, in collaboration with several scenario and foresight specialists, to develop a set of qualitative and contextual scenarios of how the future might unfold by 2050.

15.   In the context of UNEP's Foresight Trajectory, priority is placed on gaining a better understanding of whether the scenario assumptions, attributes and contextual factors might look different in different parts of the world. These scenarios were therefore applied and informed the work carried out in the context of a series of regional foresight workshops that took place across each of the UNEP regions, specifically, Africa, Asia Pacific, Europe, Latin America and the Caribbean (LAC), North America and West Asia.

16.   These scenarios were developed using a widely accepted methodology. The methods used in this process and the resulting alternative futures drew on the intelligence of the collective for better insights on the forces shaping change. To provide initial input into the scenario building process, relevant external factors were elicited via a survey aimed at UNEP's Senior Management Team (SMT) and the ISC-UNEP Foresight Expert Panel (FEP). The survey questions and how the results were processed can be read in Annex 1. This was followed by an online brainstorming session with the workshop participants.

17.   The two surveys, the online brainstorm material, and a baseline report summarising relevant UNEP publications and recent global megatrend reports, subsequently served as input for a two-day scenario workshop where the factors were discussed and condensed into a list of 13 factors (Annex 2). For each of these 13 factors the range of uncertainty was identified to reflect the spectrum of plausible outcomes by the year 2050.

18.   The participants then assessed the potential impact and level of uncertainty of each of these factors, and jointly selected the combination which formed the key uncertainties. With these, a scenario framework was constructed, against which four relevant and yet plausible scenarios were developed (**Annex 3**). Following two rounds of discussion, the participants imagined how each of the 13 factors could play out over the 2023 to 2050 period. After the workshop, the scenario narratives were drafted and presented in their first iteration back to the group for review and validation to ensure that the narratives accurately reflected the outcomes of the workshop discussions.

19.   With the view to creating context and coherence between the scenario narratives and the initial analysis and results of the Delphi survey, and to facilitate the use of the scenario set as a tool during the global sensemaking session of the horizon scanning, it was decided that the 13 factors initially used to create the scenario framework / logic should be examined and mapped against the eight epicentres that emerged from the analysis of the Delphi Survey. The 13 factors were largely convergent with the eight epicentres. The scenarios were then reiterated against the eight 'epicentres' to provide initial summaries of

how each of the epicentres could take shape through the lens of each scenario. The draft scenario framework and summaries were shared with Foresight Expert Panel during the sensemaking session.

20.   These scenarios were applied in the horizon scanning global sensemaking session in September 2023 as well as at the regional foresight workshops, as outlined in *subsection 2.2.3* and *section III*, to form a backdrop for strategy development and testing.

2.2 Horizon scanning: Delphi surveys

21.   The Horizon Scanning Delphi Survey was the first intelligence / data gathering point in the UNEP-ISC foresight process, and aimed to source inputs from a diverse range of experts and stakeholders. Data gathering for the Delphi survey was conducted in two stages from May to June 2023, and in April 2024.

22.   Four main key target groups were identified for the survey: (i) UNEP staff; (ii) Member States; (iii) UNEP major groups and stakeholders; and (iv) the scientific and expert community. In addition to those experts that work on environmental issues, efforts were made to solicit input from experts focusing on underrepresented specialisations and thematic areas not typically found in the environmental sustainability domain, such as behavioural and cognitive sciences, humanities, gender and indigenous perspectives.

23.   The framing and design of the Delphi survey was informed by the outcomes of the 2021 UNEP Foresight exercise, two-focus group sessions (February 2023 and April 2023), several discussions with the Project Team, and in close consultation with selected experts and UNEP's and ISC's communications team. The survey logic, user-interface and accessibility were beta-tested by 25 individuals in May 2023, and adjustments were implemented accordingly.

24.   At the beginning of the process the survey aimed to elicit a wide range of perspectives from experts, Member States, stakeholders and UNEP staff on the following key question: "What specific signs of change emerging on the horizon could potentially disrupt, positively or negatively, human well-being and planetary health between now and 2030?" Respondents were requested to provide up to three signals, provide a short description and justification of their disruptive potential, and supporting evidence.

25.   A total of 790 usable responses were received by the closing date of 30 June 2023. Within these responses a total of 1,156 entries were submitted. The data was distributed as follows: Africa 19%, Asia Pacific 26%, Europe 33%, Latin America and the Caribbean 8%, North America 10%, and West Asia 4%. The estimated overall response rate was 13.6%. However, the results show significant regional variation in response, even with the same effort, due to potential design barriers including language.

26.   The data from the survey was processed and coded in ATLAS.ti and analysed using Grounded Theory, bottom-up clustering and constant comparative techniques to derive themes and patterns and to facilitate initial exploratory comparison and interpretation. The analysis included two rounds of tagging and three iterative rounds of sorting and clustering. Given the volume of qualitative data, three teams worked in parallel to support tagging, coding and clustering. The decision to use ATLAS.ti was informed by its versatility and functionality / tools including its capacity to map co-occurring codes and generate visualisations.

27.   The Delphi survey was rolled out in two phases. The first was open from May to June 2023 and included an open-ended exploratory question anchored around the concept of human well-being and planetary health, including requests for the nomination of issues and the submission of associated evidence. The rationale for using this framing was two-fold:

i. First, the concept of human well-being and planetary health was co-created by a wide range of epistemic communities (including environmental sciences, ecology, population, health, medicine, human rights, etc.) with the intention of being inclusive and relevant to different disciplinary fields and audiences. It was considered that reducing the framing to one single dimension (i.e. the environment) would limit the types of inputs and informed views.

ii. Second, the survey was aimed at generating insights into possible signals of positive or negative change, including disruptions, risks, threats and opportunities and the dynamics of change, from a broad range of experts, well beyond traditional environmental fields.

28. The second phase in the Delphi method consisted of in-depth interviews and consultations on specific issues or themes that emerged from this initial intelligence gathering, analysis and sensemaking. These inputs were drawn from a subset of respondents who participated in Phase One and who consented to participating in Phase Two.

29. Identifying and minimising the risk of group, representative and/or individual bias in the survey responses is a critical consideration that needed to be factored into the horizon scanning process, mitigating these risks through the method where possible. This was a major effort undertaken by the expert panel during the sensemaking workshops. Through the facilitation process, the expert panel reviewed the outputs from the survey and among other things, worked to identify and mitigate any potential bias, while acknowledging that the complete elimination of bias, including the experts' bias, is difficult. Table 1 presents a summary of risks (issues), implications and how we mitigated bias throughout the process.

Table 1. *Identifying and minimising the risk of bias*		
Issue (potential bias)	Implications	Mitigation of bias
Longer timeframes	Greater uncertainty on both the impact and the likelihood of the risk/opportunity	Delphi design: Explicit emphasis on shorter timeframe;
Over-focus on trends analysis - *availability heuristic*	Over influence by current/recent trends and events. Can lead to missing out on unforeseen innovation	Delphi design: Explicit emphasis on novelty, trend discontinuities combined with explorative scenario planning
Over reliance on previous assessments trends or Anchoring bias	Weaker signals may be under-rated or ignored. Tendency to rely too heavily on a single piece of information, which is often the first obtained)	Mapping megatrends and prevailing risks. Use of advocates both for and against a specific issue; multiple rounds of scoring in different orders during sensemaking
Misrating of risk, disruptions	Over representing of standard knowledge, understandable risks, under-rating of complex and difficult to understand risks	Baseline megatrends will identify prevailing risks; sensemaking and regional foresight validation will review clusters and 'outliers'
Hysteria and fads/ group think; salience bias	Over representing prominent or emotionally impactful issues, especially when particularly vocal or skilled raconteurs are advocating.	Clustering / constant comparative analysis parameters, rules on advocating positions vigilantly, enforced during sensemaking
Knowledge asymmetries / overrepresentation of signals	Over representing of standard knowledge, understandable risks, weaker signals go undetected / under-rated	Regional foresight workshops. Careful curation of experts, inputs / sensemaking experts invited to challenge rankings
		(adapted from Bonaccorsi et al. 2020)

2.2.1 Literature review

30.   As part of the sifting and clustering of ideas in Fig. 1, a review of the scientific literature was initiated in the early phase of the process to identify (i) current trends and emerging issues that will impact the global environment; and (ii) provide an overview of available tools and methods for horizon scanning and foresight and their application.

31.   The first part of the literature review focused on changes, surprises and emerging issues associated with a range of environmental issues and concepts, including climate change, environmental change, ecosystem change and response, food security, water security, planetary health, extreme events, human dimensions of global change and human wellbeing.

32.   The second part of the literature review identified existing foresight tools and methods applied in the field of environmental science and sustainable development, their fields and contexts of application, their theoretical underpinnings, their limitations, the role of new digital technologies and artificial intelligence (AI) in horizon scanning and foresight, and evidence of impact of horizon scanning and foresight on decision-making. Given limitations from the project team and resources, only literature in English will be referenced. Referenced literature review will feed into the initial issue identification and will contribute to establishing the baseline and provide context for the assessment of the signals of change.

2.2.2 Data sourcing and target groups

33.   The Delphi survey sourced inputs from a diverse range of experts and stakeholders. In addition to experts working on environmental issues (including but not limited to climate change, biodiversity and nature loss, pollution, human and ecosystem health, land degradation, natural resource depletion, waste, risks and technologies) efforts were made to solicit input from experts focusing on underrepresented specialisations and thematic areas not typically found in the environmental sustainability domain (e.g. behavioural and cognitive sciences, humanities, gender and indigenous perspectives). This includes individuals with interdisciplinarity, transdisciplinary and foresight experience. Four main target groups were identified for the survey: (i) UNEP staff, (ii) Member States, (iii) UNEP major groups and stakeholders, and (iv) the scientific and expert community.

34.   The survey was disseminated using a semi-curated approach that drew on the membership and wider networks of UNEP and the ISC. While this survey was intended to gather insights from the environmental community, deliberate efforts were also made to go beyond and engage with the full breadth of scientific disciplines across natural sciences, social sciences and humanities. To capture informed views from the organised scientific communities that have regional or global representation, the survey also included constituted multidisciplinary networks and international interdisciplinary expert groups. For the fourth category of target groups (scientific and expert community), the survey recipients were curated as outlined in Annex 4.

2.2.3 Horizon scanning sensemaking and use of the scenarios

35.   The first iteration of the scenarios, combined with the results of the Delphi Survey analysis provided input to the expert panel's sensemaking workshop, in September 2023. The role of the expert panel was to participate in a structured debate to (1) review, adjust and to prioritise the initial issues and signals and identified phenomena gleaned from the survey; and (2) to connect the issues from the horizon scanning to the set of scenario narratives. The function of the scenario set was to provide a structure or framing for the issues and signals identified through the horizon scanning exercise. The expert panel supported attributing horizon scanning issues and signals to specific scenarios. It also supported identifying

where issues and signals from the horizon scanning may fall out of or challenge the meta-frame, and how the meta-frame may have to be further developed or adjusted.

III. Regional foresight workshops

36.   Both the scenario development and the exploratory horizon scanning exercise take a planetary or global perspective. While this perspective brings value (granularity) for a global strategic exercise, it does risk excluding the divergence of regionally specific sociocultural contexts as well as discounting the subtle but important differences in perception, knowledge acquisition, motivation, and resources in different regions. Such differences may not be fully considered through an exclusively global level exercise and the influence they have on any potential future national and regional action or institutional responses may be significant.

37.   To address this risk, while facilitating the greater usability of its foresight results, UNEP incorporated a regional engagement component as a key element of its foresight trajectory. In this component, the results of the global scenario development and the horizon scanning exercise were presented to a selection of expert participants from UNEP's six world regions. To contextualise the global findings and explore region-specific dynamics, issues, risks, and opportunities, the regional workshops were held in each of the six UNEP regions: Europe, Africa, North America, West Asia, Latin America and the Caribbean and Asia / Pacific.

38.   The process was co-designed by UNEP's Office of the Chief Scientist (OCS) and the European Commission Joint Research Centre Foresight team. The intention was to develop a facilitated process, that could be implemented in a standardized fashion across the six UNEP regions. It consisted of a series of facilitated breakout sessions during which participants discussed emerging changes in the context of the four UNEP scenarios (**Annex 4**). Each of the six 2-day workshops were held following Chatham House Rules. In addition, a youth workshop was also held in the margins of the 2024 Global Youth Environment Assembly (February 2024) in Nairobi, Kenya, to collect the views of members of the UNEP children and youth major group.

39.   In the workshop process, participants were first invited to review and deliberate the global level scenarios before specifying and identifying how their effects and strategic actions could play out in their respective regions, reflecting on how this could affect the transition towards a future of improved planetary health and human wellbeing.

The participatory process for the foresight workshop was organised around 3 key exercises:

 I.   **Reviewing Scenarios**: Participants were presented with the four UNEP scenarios used as a foresight tool to engage in systemic reflections and the exploration of potential challenges, opportunities, and options for action in their region. Participants were invited to familiarise themselves with the four scenarios, and to consider how to contextualise each of the thematic areas for their region.

 II. **Exploring Changes**: participants were invited to a second round of discussion on exploring what sequence of changes could lead us from the present to each of the four scenarios with the view to analysing the potential for disruption of the state of the environment, planetary health and human well-being.

 III. **Identifying Key Interventions**: Action oriented strategic reflection to identify how each of the main changes impact sustainable development in the region and to propose specific policy interventions that could be implemented to address changes that could negatively impact sustainable development.

3.1 Global sensemaking

40.   The second Global Sensemaking workshop with the Foresight Expert Panel took place 20-21 March 2024, focusing on reviewing and debating the Horizon Scanning survey's initial findings. The panel worked to identify a consolidated subset of priority signals of change, from the regional workshops and the first phase of the Delphi survey, that would be carried into the second Delphi Survey. In addition, there was a focused discussion aimed at both soliciting advice on the current approach and crafting a cohesive narrative for the Global Foresight initiative. This process was instrumental in pinpointing areas within the report that required further development, ensuring that the final output would be both comprehensive and reflective of the critical insights gathered through the foresight exercise.

41.   The insights and inputs gleaned from the regional workshops were analysed together with the emerging issues and signals of change from the Delphi. At the signal level, these were assessed according to their novelty, disruptive potential, level of uncertainty and availability of evidence, but no criterion around geographical scale was used for clustering or filtering. Signals with examples for particular localities or sectors as well as signals linked to global drivers or processes were considered equally.

42.   Results from the regional foresight workshops will be reviewed and analysed by the Expert Panel, in a second sensemaking workshop, and incorporated into a synthesising process to draw conclusions and provide suggestions for which issues could be the focus of future monitoring, analysis and action for the protection of the world's environment. To this end, the Expert Panel met in a workshop format in early 2024. Summaries from each of the regional workshops was fed into a global report and eventually reflected in an online foresight dashboard.

3.2 Synthesising and strategising

43.   UNEP's Senior Management team reviewed the combined results of the scenario planning and horizon scanning together with the synthesis and results of the regional workshops in the context of a strategy workshop. The strategy workshop focused on identifying and developing options for action and strategies for UNEP and for the world's environment.

44.   The results of the UNEP Foresight Trajectory was distilled into a Global Foresight Report (a standalone biennial publication) for the United Nations Secretary General's Summit of the Future in September 2024. The target audience for the report are Member States (through the Permanent Missions to the UN in New York and the Committee of Permanent Representatives at UNEP in Nairobi), as well as the general public and other UN agencies.

3.3 Limitations

45.   While data obtained through the Delphi surveys provided valuable insights into potential signals of change that may have an impact on the environment, there are several limitations to the methodology and the data derived that must be acknowledged. With the Delphi survey efforts were made to achieve balanced gender and geographic diversity with specific efforts to encourage young people to complete the survey. Respondents were requested to provide information on their gender, age, and country of nationality. Despite, skewed responses were received potentially introducing biases in the data.

46.   The final sample consisted of 60.4% male and 38.2% female respondents across both parts of the Delphi survey, with 1.4% preferring not to respond. This discrepancy could potentially influence the findings, particularly in areas where gender perspectives on environmental impacts may differ, for example,

women were more likely to rate the impacts of the signals of change as more severe than men with women rating the impacts higher in 15 of the 18 signals of change

47.   The age distribution of the respondents showed a paucity of younger individuals, with 8% of all participants across both surveys being aged between 18 and 34. While this reflects the engagement of older demographics in environmental issues, it may not fully capture the perspectives of younger age groups, who might have different views or experiences related to what possible signals of change they are most concerned about.

48.   Regional representation of the respondents was also skewed towards certain regions. Representative geographical spread was achieved in four of the six UNEP regions. An overrepresentation of responses came from the European Region (31%), while responses from Asia Pacific were underrepresented. This imbalance may also have affected the generalizability of the findings, as the environmental impacts and perceptions in each of the six UNEP regions can differ significantly. Efforts to enhance gender, age, and regional diversity obtained through the survey responses were made through the hosting of the regional and youth workshops which contributed to mitigating bias and ensuring regional and youth perspectives were captured.

49.   The interpretation of results must be viewed through this lens. These limitations and potential for bias underscore the importance of striving for a more balanced and representative samples in future exercises.

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Annex 1 - Schematic representation of sequential steps in the UNEP foresight exercise

Scoping

| Initial Preparations | Forming the Foresight | Stakeholder Surveys | Inception Workshop |

2. Exploratory Data Gathering

Delphi Survey Round 1

3. Developing Scenarios

Scenario set, 2050

4. Interpreting

Exploratory Clustering Analysis

Horizon Scanning Sensemaking Workshop 1

5. Contextualizing: Probing, Feedback, Adjusting

| Europe Workshop | Africa Workshop | North America Workshop | West Asia Workshop | Latin America & Caribbean Workshop | Asia Pacific Workshop | Youth Scenario Workshop |

Sensemaking Workshop 2

Delphi Questionnaire Round 2 (Also is in 2 & 4)

6. Learning & Reporting

Annex 2 – UNEP Senior Management Team (SMT) and Foresight Expert Panel (FEP) Surveys

In preparation of the scenario building workshop in Nairobi both the members of the Senior Management Team (SMT) and the members of the Foresight Expert Panel (FEP) were sent a survey with the seven questions below:

1. In your opinion, what are key factors that influence the future of planet Earth and its ability to sustain the natural world and human life?

2. What factors do you think currently get overlooked when it comes to understanding what the future can bring for planet Earth?

3. If you could see into the future, what would you like to know about how life on planet Earth may change?

4. What sudden, impactful events could reshape the future of planet Earth?

5. What are your main hopes for the development of planet Earth?

6. What are your biggest fears for the development of planet Earth?

7. With the current foresight trajectory at UNEP, we are trying to build a tool to help our understanding of the potential future of planet Earth.
   In your view: What three specific questions should this tool help to answer?

Prospex / De Ruijter Strategy collected and clustered all the answers by the 11 respondents of the SMT and the 12 respondents of the FEP. The results were reported in a separate document, and a side-by-side comparison of the results was presented during the Nairobi workshop.

Based on the two surveys, the baseline report and two workshops, 13 broad factors were identified based on hundreds of factors considered. The set of factors listed below, and further elaborated in Annex 2, were distilled as being of importance to planetary health by 2050:

1. Planetary Boundaries - Climate change effects and ecosystem collapse
2. Artificial Intelligence (AI) and new technology
3. Attitude, ability, consumption of humans and their organisations
4. Growth, wealth and technology distribution in global economy
5. Political instability and conflict
6. Health and food threats, advances and alterations
7. Space exploration and risks
8. Truth and trust in human interaction
9. Population: growth, aging, migration
10. Resource scarcity
11. Pollution
12. Changes in multilateralism
13. Supply to meet rising energy demand

Annex 3 – First generation scenario framework and summaries

Geopolitical / Sociopolitical instability

Planetary boundaries crossed

Trust and technology enabling

Trust and technology constraining

Scenario A
Sustainability Paradox

Scenario B
Post-truth Division

Scenario D
Global Awakening

Scenario C
Fortress Multipolarity

Planetary boundaries maintained

Increased cooperation
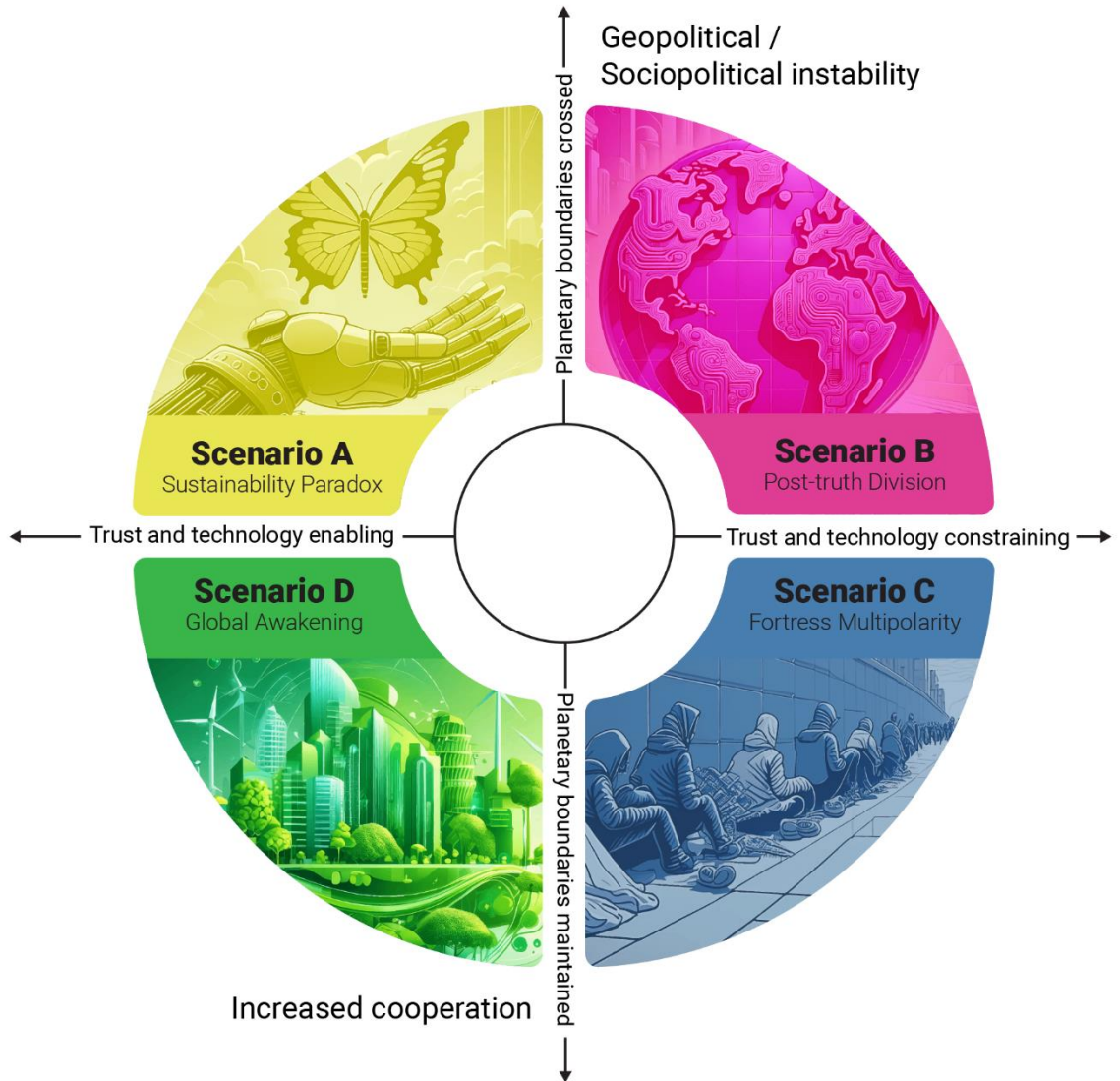
Summary of Scenarios[3]

Scenario A - Sustainability Paradox

Synopsis: This scenario envisages a world where 'green meets greed'. A high degree of trust is placed in science and technology and is actively used to successfully solve the symptoms of many environmental problems and resource scarcity. Market forces dominate socio-political agendas. Trust is placed in further globalisation with the liberalisation of trade flows and capitalization – increasing the wealth of corporate elites. Society and institutions continue to believe that economies can grow exponentially, and people continue to consume without limits, since "green technology" will take care of emerging pollutants, climate change and severe losses of ecosystem services and biodiversity. In line with the Jevons' paradox, the more efficient products and production become, the faster consumption grows. Many of the short-term technological innovations and resulting social dynamics generate new, unintended environmental change issues and exacerbate root problems. The scramble for resources leads over time to increased conflict, protectionism, and geopolitical instability where disparities and inequality prevail. By 2050, collective action problems remain unanswered, and the world operates well outside the safe operating limits of planetary boundaries.

Scenario B Post-truth Division

Synopsis: This scenario describes a future where the promise of artificial intelligence and technology is seen to have failed humanity, trust in science is eroded and many different truths are propagated through self-organising, and in part, criminal communities where social groups are bound by shared attributes and beliefs. Conflicts exist within and across states and newly forming entities, down to the local level. The rise of exclusive communities leads to increasing border controls and barriers to trade. In this volatile world of shifting alliances, it becomes more and more difficult to reach global consensus on environmental issues. The breakdown of centralised environmental governance systems results in few direct incentives for investing in and maintaining global commons. The environment is simply no longer a priority, the economy and the security of each entity predominate. Technology is perceived as creating joblessness and eroding livelihoods. As societies fragment and localise further, each in their own bubble, people are increasingly forced to be more self-reliant and self-organising – dematerialization and circularity ("doing more with less") become a necessity. The lack of purposeful and global environmental action leads to increased exposure to extreme events, turning people even more inwards to focus on the survival of their own – and where necessary at the expense of others.

Scenario C - Fortress Multipolarity

Synopsis: This scenario assumes a future shaped by a 'polycrisis' – where a series of cascading disasters and compounding impacts affecting the world simultaneously trigger population and fertility shocks and shake the resilience of societies, economies, and governance. The world experiences multiple catastrophic climate shocks and extreme events and humanity has no choice but to adapt and to fundamentally change the trajectory of unsustainable resource utilisation and

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[3]see separate note on contextual factors, key dimension, 1st generation narratives

environmental degradation. With the changes occurring, trust in science, which has been warning for some time, is partially restored. Nevertheless, there is a general loss of trust in large institutions, both private and public, politics and societies who failed to adequately manage the environment and planetary health. This has been further emphasised by the polycrisis, fostering calls for strong, authoritative leadership. Humans reorganise themselves in hybrid "fortresses" – fortified enclaves with mega-cities that have stringent physical and virtual surveillance. The fortresses are managed using AI-based tools to protect the human wellbeing and environment by protecting people from themselves as well as against intruders at the expense of individual freedom and liberties. Collective action has occurred to respond to environmental crises, but security remains an issue due to competition for scarce resources.

Scenario D - Global Awakening

Synopsis: This scenario envisions a global awakening, as new generations recognize the interconnectedness of their actions and their impact on the health of the planet. Supported by artificial intelligence and a surge in technical innovations and breakthroughs, governments, NGO's, financial institutions, corporations, and individuals alike unite towards a common purpose: to create a world where harmony between humans and nature is paramount. This realisation, initially driven by the global youth that later becomes a new generation of leaders, is the catalyst for change, sparking an era of tech-enabled collaboration and cooperation that transcends borders and allegiances. The adoption of polycentric governance and new approaches to decision-making facilitate dramatic shifts in our ability to address the cumulative and transboundary impacts (and costs) to the environment. This scenario describes a world where human capacity for cooperation and positive actions is married with the responsible use of new technology and scientific evidence and a willingness to accept restrictions on personal choice. This facilitates not only the mitigation but also the stabilisation of the effects of climate change and biodiversity loss. This, in turn, allows human populations to reap the rewards in the form of sustainable peace and prosperity.

Scenario A: Sustainability Paradox

Themes	Contextual Factors
Environmental governance and management	• Existing **environmental governance and management** regimes are ignored. • New regulations are incoherent and can't keep pace with the speed of tech innovation.
Artificial intelligence, Innovation and technology	• Innovation in **artificial general intelligence (AGI),** quantum computing speed ahead; AI governance lags. • Huge **investment in energy decarbonisation technologies** with unrelenting demand for increasingly scarce resources. • Technological innovations spread quickly across the globe, mining in the deep ocean and space.
Economic Development and Finance	• Fragmentation of resources and fostering power divides in society. • **Greenwashing of consumerism, short-term profit, selfishness**. • **Unbridled economic growth** continues to be the primary goal.
Knowledge, attitudes, skills and habits	• People ignore scientific evidence and **consumerist behaviour persists** with negative impacts on the environment. • Worsening impacts of climate change, biodiversity loss and pollution, **force massive migrations**.
Social dynamics	• **Trust in science and technological innovation is high** and they deliver on many fronts, particularly those related to energy **decarbonization** and "green technological revolution". • This is **not, however, accompanied by the necessary behaviour changes** and therefore excessive consumption continues given that consumerism continues to be the main goal of the prevailing economic context. • The **voices and concerns of vulnerable and minority populations are ignored.**
Resource scarcity, efficiency and waste	• Every country uses its local energy sources (many still use fossil fuels but with mitigating tech such as CCS). • Benefits of so-called greener technologies are offset by increased consumption and intensive **resources use that new technologies require**. • Increasing **pollution.**

Direct Environmental Change	• Although "green technology" is available, little is done to address underlying drivers of **pollution and biodiversity loss.** • High food and water insecurity, biotech nutrition supplements. • **Emergence of new non-communicable diseases; cures** only accessible to the privileged.
Geopolitical *instability*	• Nations compete for resources: **nationalism, protectionism, driving conflicts**. • Countries mainly address local issues and focus on local adaptation through high-tech, rather than on global mitigation.

Scenario B: Post-truth Division

Themes	Contextual Factors
Environmental governance and management	• **International governance has collapsed.** • Multilateral tools for **environmental governance no longer work.** • Communities form **ad hoc local governance systems**.
Artificial intelligence, Innovation and technology	• Growing **mistrust in AI-driven technology.** • Innovation and ingenuity are stifled. • People prefer to trust their own instincts and own social group, declining trust in science, innovation and technology.
Economic Development and Finance	• Globalization has failed, massive **economic disruptions.** • Communities are forced to be self-sufficient: **localised economies, barter,** local currencies.
Knowledge, attitudes, skills and habits	• People are forced into self-reliance, **migrate to the last remaining habitable areas,** focus on their own survival. • **Work focused on** fulfilling basic needs. • **Learning and education are limited** to what is needed for survival.
Social dynamics	• **Low trust in science and institutions** • **Competing** forms of truth. • Rise of populist leaders and "gurus".
Resource scarcity, efficiency and waste	• Low consumption lifestyles decrease pressure on scarce resources. • Minimal need for mining of tech enabling metals and minerals because of limited tech deployment. • High incentive for people to **adopt low carbon, circular lifestyles.**
Direct Environmental Change	• **Planetary boundaries are breached.** People do what they can to survive. • Global Food systems collapse, rise of local food production. Landscapes become more diverse and multifunctional as local communities try to survive. • Rise of agroforestry, silvopastoral systems, non-conventional foodstuffs (e.g. insects).

Geopolitical *instability*	**Recurrent mass migration** as people flee devastated areas in search for resources. - The rampant lack of trust between social groups creates a volatile geopolitical environment. - This feeds populism **and protectionism**. - Many conflicts over resources.

Scenario C: Fortress Multipolarity

Themes	Contextual Factors
Environmental governance and management	• **New, regional** governance systems replace existing multilateral system. • The limits between the public and private sectors are increasingly blurred, less **transparency.** • Harsh penalties to maintain environmental and social order.
Artificial intelligence, Innovation and technology	• People and institutions depend more on technology but trust it less. • AGI is manipulated to force people and companies to stay within strict environmental and social boundaries. • Authorities stifle creative thinking for fear of uprisings and **social unrest**.
Economic Development and Finance	• Diverse local economic systems • **Business still flourishes; however, they do not focus on sustainability**. Protectionism keeps wealth in the hands of a few. • A few strong trade blocks to support necessary resource exchanges.
Knowledge, attitudes, skills and habits	• **Population crash due to polycrisis**. People flee to cities for protection and resilience. • Use of virtual reality rises in urban areas minimising material consumption. • **Behavioral control of the population.** • **Labour exploitation of poor people for** resource mining, etc**.**
Social dynamics	• **Low trust, authorities manipulate truth** to control people. • This affects social cohesion, technology and institutions.
Resource scarcity, efficiency and waste	• **Hoarding of scarce resources** • **Intense use of circular approaches, efficiency**, minimal wastage • Authorities direct people towards virtual consumption, leading to a de- growth environment. • Better sustainable energy sources make energy cheaper and cities more liveable.

Direct Environmental Change	• Contrasted areas: highly degraded land next to abandoned regions where **nature regenerates**. • High food and water insecurity managed using AI-enabled precision farming. Minimal wastage. • **Nutrition is supplemented with synthetic substitutes**.
Geopolitical *instability*	• **Cooperation among regional 'fortresses', the** authority of nation-states diminishes. • Authoritarian fortresses capture public imagination. AGI enables this change and help to maintain good quality of life within. • A **new multilateralism emerges** as a network of loosely connected hubs of power. • **Information is manipulated to prevent conflicts,** exert control.

Scenario D: Global Awakening

Themes	Contextual Factors
Environmental governance and management	• New, stronger **polycentric approach to environmental governance.** • Effective and transparent implementation of environmental laws with economic and social benefits. • Agile regulation accompanies new technologies.
Artificial intelligence, Innovation and technology	• AI based technologies help to radically reduce energy and resource use. • Innovation in **artificial general intelligence and** quantum computing drives fast decarbonisation, circularity • Global AI governance is **robust;** universal strong data protection.
Economic Development and Finance	• Governments have adopted new wellbeing indicators beyond economic growth to drive policy towards human and planetary health. • **Business and industry become sustainable**
Knowledge, attitudes, skills and habits	• **Feeling of unity with nature and social justice in society**. • New **leaders are** willing to sacrifice certain privileges and freedoms. • Environmental taxation is normalized.
Social dynamics	• AI-driven advancements facilitate **evidence-informed policymaking.** • **Major shifts in behaviour that minimize consumption.** Decision-makers **consider the needs of the most vulnerable groups.**
Resource scarcity, efficiency and waste	• Efficient technologies used to manage **resource scarcity** and **decarbonization**. • **Circularity becomes a reality**. • **Major shifts** technology enables **new patterns of sustainable** consumption and production.
Direct Environmental Change	• Aggressive climate adaptation and mitigation measures. • The world is moving back towards an equilibrium of planetary health. • Use of technology to restore natural habitats and resources. • Agriculture shift towards sustainable practices.

Geopolitical *instability*	**Increased cooperation** among all actors to protect the global commons. **Multilateralism is reinvigorated.** - The **emergence of strong data protection regime** shapes the power of AI-based technologies. **Nationalism, isolationism**, **mass migration under control**

Annex 4 - Curation of survey recipients

The survey was disseminated using a semi-curated approach that draws on the membership and wider networks of UNEP and the International Science Council (ISC). While it is intended to gather insights from the environmental community, deliberate efforts have also been made to go beyond and engage with the full breadth of scientific disciplines across natural sciences, social sciences and humanities. To capture informed views from the organised scientific communities that have regional or global representation, the survey also included multidisciplinary networks and previously curated expert groups.

For the fourth category of target groups (scientific and expert community), the survey was disseminated to the following constituencies:

- Membership of the International Science Council
  - Through the ISC national members, comprising national academies of sciences and research councils in 140 countries that are asked to disseminate the survey to relevant experts and networks
  - International scientific unions and associations that federate disciplinary scientists at the international level across the natural and social sciences
  - Affiliated members of the ISC, which includes organisations whose missions relate to promoting international scientific collaboration for societal impact
- International research programmes and international scientific committees co-sponsored by the ISC and other international organisations (e.g., from the UN system) and focus on specific areas of international research on a wide range of issues and thematic areas (such as ocean, space research, urban health, inequality, data science, global observing systems, etc.)
- Experts engaged in projects led by the ISC of relevance to the Foresight Exercise e.g., review group of the ISC COVID-19 Scenarios project, Rethinking Human Development, Letter from the Scientific Community on the occasion of the Stockholm+50 conference, UN Water Conference, etc.
- All the ISC Fellows appointed by the ISC Governing Board
- Experts nominated by ISC regional focal points located in Colombia, South Africa and Australia
- Scientists convened by the ISC in its capacity as co-chair of the Scientific and Technological Community Major Group for the SDGs and the Sendai Framework for Disaster Risk Reduction

UNEP-ISC Horizon Scanning Foresight
System mapping

Annex 6 - Framework for Selection of emerging Clusters and Signals of Change

This framework has been generated to aid the analysis of signals of change and contextual data and information that should be highlighted in UNEP's Global Environmental Foresight Report: Navigating New Horizons. At present, there are no comprehensive guidelines or universally appropriate/accept approach (in the empirical literature or beyond) for the identification and interpretation of signals of change (Mauno et al. 2023). As such, the conceptual framework below is designed to facilitate the analysis and target the work (and insights gleaned) with signals of change. The framework will be applied to the +200 signals of change generated through the Delphi survey (phase one) and Regional Workshops to help characterise and prioritise issues that have emerged – considering regional context. These workshops reviewed the importance of long-term planetary health in relation to a set of qualitative scenarios (alternative future) and were able identify well-established change (i.e., mega-trends), emerging change (recent change that are consequences of mega-trends) and speculative change (weak signal) that may or may not become significant in the future.

A subset of issues was prioritised as those with disruptive potential (indirect or direct) and embedded in the Second round of the Delphi Survey (April 2024). It is a tool only and does not necessarily mean what is ranked highly will be selected for further review. The analysis and interpretation of signals was be guided by deliberations of the Expert Foresight Panel during their second sensemaking workshop in March 2024. The framework is built on key issues including the significance of a signal of change on planetary health and human wellbeing, its disruptive potential and in some cases its novelty.
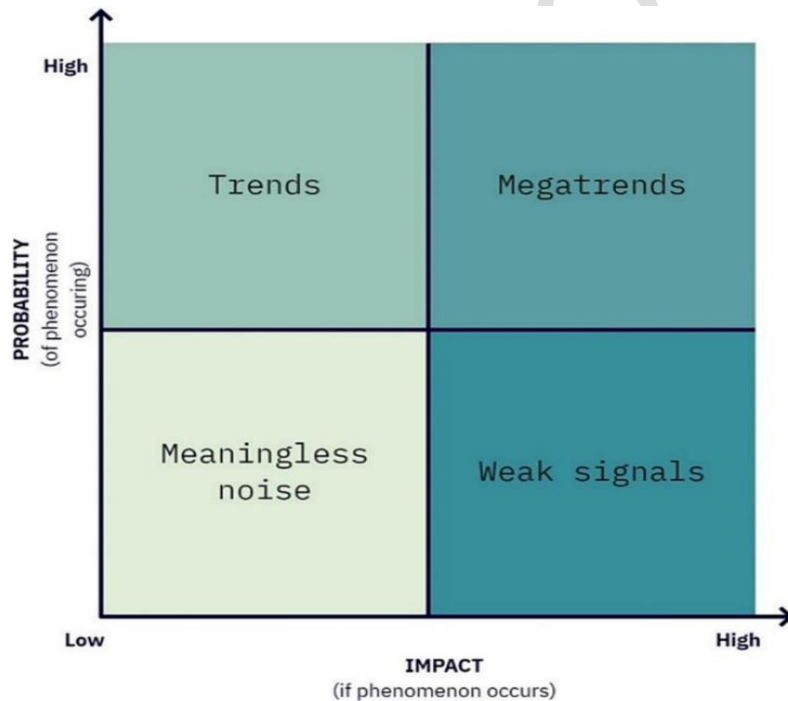
Megatrends

The following megatrends (below) have emerged from the analysis and consultations. For the purposes of this work, megatrends are defined as widespread and long-term (or sustained) social, economic, environmental, political or technological pattern of change that are slow to form but have a major impact once in place – the trajectory of change (and sometimes the impact) can lead to irreversible transformations or disruption. While megatrends are global in nature, they can unfold differently from region to region. The megatrends are not intended to be exhaustive.

(1) **Declining trust in public institutions** *including science/ scientific enterprise, leaders*

(2) **Multipolarity** *and the expanding influence of non-state actors*

(3) **Widening inequalities** *– absolute number of people living in extreme poverty declining vs the rapid widening between the wealthiest and poorest of the population*

(4) **Rapid technological change** *– including acceleration of digitalisation, hyperconnectivity and the rapid advancements in Artificial Intelligence*

(**overarching) **Global Polycrisis** *– Two or more cascading simultaneous events/ crises, in space and time become causally entangled –i.e., the interactive effects among them escalate the severity of impacts of each (feedback loop)– and thereby significantly degrade global planetary health and thus humanity's prospects for wellbeing in a relatively short period of time.*

Table 1 - Attributes and indicators for evaluating signals of change.

Attribute	Indicator for inclusion	Strength		
		Low	Medium	High
Prevalence Instances of nomination (from both Delphi and regional workshops/ consultations)	Percentage of the total number of signals	<10%	10-50%	>50%
Prevalence Regional workshops		1	3	6
Novelty (measured through google scholar, analytics – instances since 2020)	< 5 journal articles	<500	31-500	0-30 articles
Probability of phenomena occurring	change would occur in less than 10 years	unlikely	possible	Highly likely
Impact - Consequence of change/ phenomena and affecting planetary health		Minor (very local)	Major (regional) change	Catastrophic (global)i
Impact Would the change represent a sudden disruption	Y/N	Slow-onset (chronic)		Acute (sudden)
Total				
NOTE: For the prioritisation and evaluation of signals, the direction of signal impact (i.e., positive, negative, neutral) is irrelevant.				

Annex 7 - Glossary of key terms relevant to the UNEP-ISC Foresight work

Disruptions: Sudden or sharp shifts that can interrupt a trend, behaviour activity or process and can cause a potential disturbance or problem. Disruptions can be negative or positive (e.g. process improvements, innovation, solutions etc.).

Cluster of emerging change (CEC): this is a process-specific term (see draft UNEP-ISC Methods paper) used to describe broader categories (or groupings) that were ultimately the outcome of the initial exploratory analysis of data from the 2023 Horizon Scanning Delphi Survey (Phase 1) and that were further developed to reflect the deliberations of the global sensemaking session with the Foresight Expert Panel. The groupings or clusters are intended to reflect broader sets of related phenomena, characterised by similar dynamics (of the nature of changes).

Environment: The natural world including as a whole or in a particular geographical area, especially as affected by human activity and includes human settlements.

Exnovation: The concept of exnovation refers to the process of actively discarding outdated, inefficient or harmful technologies, practices and norms, and that goes hand-in-hand with actively unlearning ingrained beliefs, attitudes or behaviours that may have underestimated transformative potential to advance sustainability.

Foresight: A structured, multi-disciplinary approach to thinking systematically and exploring trends, emerging changes and to inform and enable present-day decisions and priority-setting. Foresight is not about forecasting or predicting the future, but rather, it uses alternative futures and collective intelligence gathering processes intended to augment traditional forms of analysis and decision-making.

Futures: is the broad academic and professional field developing globally as well as research, methods and tools that are available to be used to develop a foresight capacity.

Horizon scanning: The foundation of a Strategic Foresight process and is the systematic outlook to detect early signs of potentially important developments by examining potential threats and opportunities. It involves a set of techniques and assumes ongoing monitoring of changes as they mature into trends. Horizon scanning can be used to support organizations and decision-makers in anticipating future developments, managing risks and pursuing opportunities to build resilience to future shocks and reduce uncertainty.

Human wellbeing: Can be understood as how people feel and how they function both on a personal and social level, and how they evaluate their lives as a whole.

Market leakage: An increase in greenhouse gas emissions when a project changes the supply and demand equilibrium, causing other market actors to shift their activities. For example, if a large forest-conservation project reduces the local timber supply so that demand is unmet, this may increase prices and pressures on forests elsewhere.

Megatrend: A widespread and long-term (or sustained) social, economic, environmental, political or technological pattern of change that is slow to form but has a major impact once in place—the trajectory of change (and sometimes the impact) can lead to irreversible transformations or disruption. While megatrends are global in nature, they can unfold differently from region to region, Megatrends have the nature of permanent trends that in a growing degree permeate all areas of human life.

Nature-based solutions (NbS): These are approaches to address societal challenges, such as climate change or biodiversity loss, through nature and its processes. They involve conservation, restoration or sustainable management of ecosystems to provide benefits for people and the environment.

Planetary health: Includes the relative condition and ability of our ecosystems, small and large, and the Earth's natural systems (e.g. geosphere, biosphere, cryosphere, hydrosphere and atmosphere) to support human societies.

Global Polycrisis: Occurs when two or more crises that may be independent or not, become causally entangled—i.e. the interactive effects among them escalate the severity of impacts of each—and thereby significantly degrade global planetary health and thus humanity's prospects for wellbeing in a relatively short period of time. These interacting, cascading series of events or sudden (non-linear) crises, across space and time, occur simultaneously and therefore produce harms greater than the sum of those the crises would produce in isolation, were their host systems not so deeply interconnected.

Signal of change: The initial symptoms (or early signs) of change—they can be any small but potentially important development, practice, idea, event or innovation that points to a future possibility, different to today's norm or that could potentially disrupt, positively or negatively, current trends. Signals of change can be thought of as seeds of a possible future development. In foresight, they are often hidden among disconnected pieces of information that may initially appear to be background noise but ultimately have disruptive potential through direct or indirect impacts on the global environment. Signals can also help illuminate an unexpected aspect of an ongoing change.

Social contract: A tacit agreement among members of a society—the state, citizens, as well as private and civil society sectors—that defines their mutual relationships, respective responsibilities, shared values and expectations of each other.

Solar radiation modification: Intentional human intervention in the Earth's climate system to reflect a portion of incoming sunlight back into space or to reduce the amount of solar radiation reaching the Earth's surface, with the aim of counteracting global warming or mitigating its effects.

Strategic Foresight: is an organisational capacity that informs the development of strategy. It allows decision-makers and stakeholders to look outside, above and beyond, and have structured strategic conversations about change, uncertainty and complexity, and take its impacts into account.

Trends: A general pattern or direction of change that has been observed over time, which may continue or shift in the future. Trends can be strong or weak, increasing, decreasing or stable (mature) and are used in foresight to understand the trajectory of developments. In the context of foresight, trends describe the expected future, the high-probability developments that need to be addressed. Focusing exclusively on trends risks being blindsided by surprises. describe the expected future; the high-probability developments whereas weak signals often represent events with a low probability of occurrence but potentially significant impact or disruption (positive or negative). The analysis and interpretation of weak signals must be distinguished from "noise" – events and issues that are either not relevant or are "masking" the actual trends.

Triple planetary crisis: The intersecting challenges of pollution, biodiversity loss and climate change, collectively posing significant threats to the Earth's environment, ecosystems and human wellbeing.

Unlearning: The process of letting go of outdated or inaccurate information, beliefs or behaviours in order to make room for new learning and growth.