

Progress report, observation and analysis

Adaptation indicators related to food and agriculture (Target 9b) of the UAE framework for Global Climate Resilience

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1. Background

At the recent Global Goal on Adaptation (GGA) workshop in Sharm El-Sheikh in October 2024, experts and negotiators gathered to discuss progress in reviewing and refining indicators across the GGA targets, including food and agriculture (Target 9b). Discussions at the workshop emphasized the need for a unified, consistent approach to indicator review, based on the observation that the various expert groups used different approaches to review the indicators. The experts and negotiators also reflected on the value and challenges of applying the indicators mapping criteria established through paragraph 12 of the SB60 conclusions. To address these issues, SB chairs provided additional guidance to experts, highlighting two main priorities for indicator refinement: a) The relevance of the indicators to measuring progress towards one or more of the targets referred to in paragraphs 9–10 of decision 2/CMA 5. and b) The specific relevance of the indicators to adaptation, including enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change. This was to be achieved by indicating ‘yes’, ‘no’, or ‘maybe’ for each indicator as well as explaining the reason for each tagging.

This report offers a high-level overview of the expert group’s work on Target 9b indicators, focusing on food and agriculture. It presents:

- **Process overview:** An overview of the approach taken by the expert group to review indicators tagged to Target 9b
- **Key findings:** A summary of initial findings on indicators contained in the database, identifying key gaps.
- **Reflections:** Insights into challenges and learnings from the indicator mapping process.
- **Recommendations:** Proposed steps to refine and expand the indicators to better identify and develop indicators for assessing progress in the GGA targets.

The report completes and draws on the Excel sheet submitted by the expert group which captures the mapping and tagging of indicators.

2. Process overview

In line with the discussions at the GGA workshop and guidance from the SB chairs, the expert groups’ primary focus at this stage was to review the database of indicators provided by the SB chairs, tagging them according to criteria contained in para 12 a – b of the SB 60 conclusions as a preliminary step toward the refinement of indicators. This tagging process is intended to simplify the identification of relevant indicators, supporting discussions on which indicators to prioritize or build upon when deciding on indicators for the GGA targets. It also helps in mapping gaps where new indicators might need to be developed. Although the experts initially only worked with a database containing submissions from parties and non-parties to the SB chairs, the current exercise also incorporated indicators mapped by the Adaptation Committee.

The database offered a central compilation of indicators along with additional information. First, due to overlap in reference documents used by both the SB chairs and the Adaptation Committee, several indicators were duplicated. A total of 2,472 duplicates were flagged, leaving 7,494 unique indicators,

which remained in the database for reference rather than being removed. Additionally, similar indicators were flagged for easy reference. Second, to facilitate focus on indicators relevant to each target, all indicators were tagged according to their respective targets based on submissions to the SB chairs or, for the Adaptation Committee’s indicators, by relevant search terms. This process allowed the group to filter and focus specifically on indicators tagged to Target 9b (Box 1). Finally, the database included columns where experts indicated their tagging of indicators based on their relevance to Target 9b and to GGA concepts, along with additional columns to capture the rationale for each tagging decision. This structure streamlined the review process and ensured that tagging decisions were well-documented for future reference.

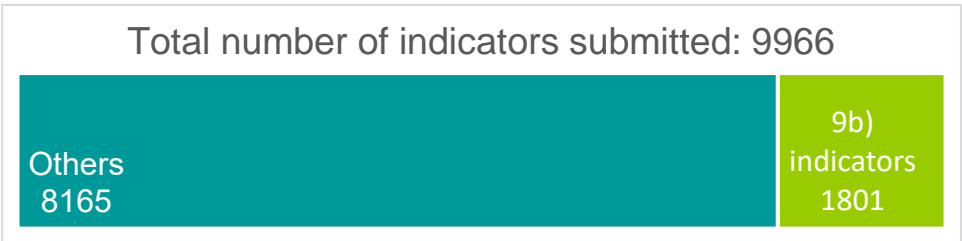
Box 1: UAE framework for global climate resilience target on food and agriculture

Target 9b of the decision 2/CMA.5 describes an ambition toward attaining climate-resilient food and agricultural production and supply and distribution of food, as well as increasing sustainable and regenerative production and equitable access to adequate food and nutrition for all by 2030.

Source: UAE–Belém framework for climate resilience (UNFCCC, 2023)

Out of 9,966 indicators, 1801 were tagged to Target 9b (Figure 1). To expedite the tagging process, the indicators were evenly distributed among the experts assigned to Target 9b. Each expert worked individually on their assigned set of indicators, with the group convening periodically to review progress, share observations, and address any concerns. Although the plan was to review each other’s tagging, time constraint could not allow this additional step.

Figure 1: Share of 9b indicators within total indicators



While the guidance from the SB chairs was to indicate ‘yes’, ‘no’, or ‘maybe’ for each indicator, we added additional columns to capture specific information on the agrifood and adaptation relevance aspects each indicator addresses, particularly for those marked as ‘yes’ or ‘maybe’ (boxes 2 and 3). This enhancement allows users of the database to access more detailed information on each indicator's relevance.

Box 2: Elements contained in the language of Target 9b in the Decision text (see box 1)

Food production: Indicators capturing adaptation actions and results related to agricultural production, such as sustainable and regenerative practices, production diversity, harvest management, and improvements in soil health and water use.

Food supply and distribution: Indicators focused on the logistics of moving food from farms to markets and consumers, including storage, processing, packaging, transportation, and distribution. Stabilizing these systems is crucial for reliable food supplies, particularly in addressing climate-induced disruptions.

Food access: Indicators assessing the ability of individuals and communities to obtain food, considering factors like physical access to markets (for physical access), and affordability (e.g., income, food price stability index etc.).

Nutrition: Indicators examining whether people are consuming diverse and nutritious foods to meet dietary needs, which helps prevent malnutrition (e.g., prevalence of stunting, wasting, anemia). This dimension emphasizes diet adequacy for health and well-being.

Box 3: Dimensions relevant to the elements of the global goal of adaptation

Climate context: Indicators capturing exposure to climatic hazards, focusing on climate condition changes that set the adaptation context. These indicators track climate parameters (e.g., changes in annual/seasonal precipitation, temperature shifts, number of hot days per year) and immediate impacts such as increased prevalence of pests and diseases, providing a basis to assess adaptation needs and effectiveness.

Vulnerability: Indicators reflecting ecological and socio-economic conditions that affect system susceptibility to climate change impacts. This includes factors like ecosystem health supporting agricultural production, livelihood dependency, and poverty levels. Such indicators highlight vulnerability in terms of exposure and susceptibility to harm.

Adaptation actions/Adaptive capacity: Indicators associated with capacity of communities (i.e., income, skills/trainings, access to finance, insurance etc.) and systems (i.e. agrobiodiversity) for adaptation actions, and potential measures that can be taken in response to current or anticipated climate impacts. This category covers actions like adoption of improved agricultural practices, institutional advancements at national and subnational levels, adaptation investments, awareness initiatives, and climate information services, early warning systems all contributing to adaptive capacity.

Resilience and Development Impacts: Indicators evaluating the outcomes and impacts of adaptation actions on different nodes of food production, supply chain and access. This includes metrics on well-being, agricultural economies, livelihoods, food security, and nutrition, reflecting the ability of systems to respond to, recover from, and manage climate risks.

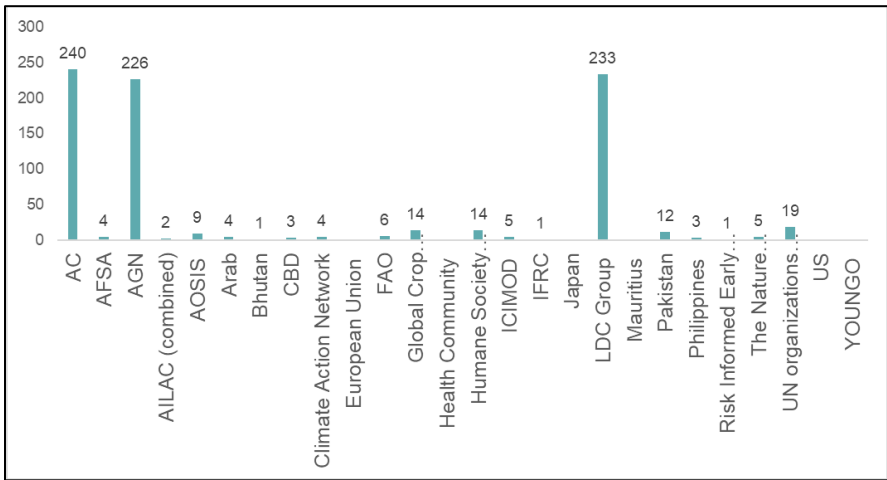
The refined database containing this additional information is provided as a supplementary annex (Annex 2). The following sections provide an overview of the findings and reflections from this process.

3. Key Findings

3.1. Indicator uniqueness

Out of the 1,801 indicators mapped to Target 9b, 380 were exact duplicates. Many of these duplicates and similar indicators appear across three submission categories: those provided by the Adaptation Committee, the African Group of Negotiators, and the LDC Group (Figure 2). Among the remaining 1,468 indicators, 781 were found to have close similarities with others in the database. This high rate of duplication and similarity highlights the opportunity to streamline and identify core indicators that may be most relevant for global assessment. Additional similar indicators are likely to be identified with further refinement.

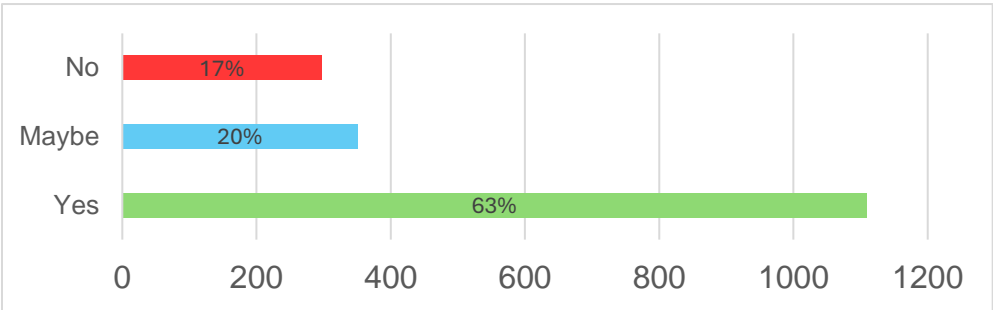
Figure 2: Number of duplicating or similar indicators by submitting entity



3.2. Relevance of indicators to Target 9b (12a)

For indicator relevance assessment under 12a—i.e., relevance to measuring progress toward one or more targets in paragraphs 9–10 of decision 2/CMA 5—the primary criteria focused on whether an indicator aligns with the target dimensions in 9b.

Figure 3 Proportion of indicators tagged as yes, no, maybe against SB Criteria 12a and target 9b



Indicators that did not directly correspond to these key variables or were in the form of ‘statements’ were marked as “No,” or “Maybe” indicating a lack of direct relevance to adaptation or revealing a need for more clarity and further discussions. Below section further outlines recurrent themes in the reasons for **categorizing indicators as ‘maybe’ under criteria 12a**:

- **Lack of direct relevance:** Many indicators do not have a straightforward or explicit link to food and agriculture. Some indicators are too broad, covering aspects like general economic productivity, safety nets, or income, which may not specifically target the agricultural sector.
- **Indicators are broad or cross-cutting:** Several indicators cover overarching themes like "productive capacities" or general economic stability, which are relevant across multiple sectors but lack specificity for agricultural adaptation.
- **Overly specific or context-dependent indicators:** Some indicators are too narrow, often focusing on household-level data, specific subgroups or specific value chains that may not be scalable or meaningful at a broader, national level.
- **Ambiguity in framing:** Indicators that are labeled as “statements” or lacking clarity making it difficult to understand their relevance to adaptation in food systems, such as references to vague terms like "good agricultural practices" or "improved capacities."
- **Overlap and redundancy with other indicators:** Several indicators are better suited for other targets of the GGA, especially in areas like water, ecosystem preservation and poverty reduction.
- **Indicators suggesting multiple elements, thus requiring further disaggregation:** Indicators that are complex or contain multiple sub-components may be challenging to track effectively, and need to be broken down into simpler, discrete metrics.

For the indicators tagged as relevant to 9b, most submitted and reviewed indicators were found to correspond primarily to **food production**, while relatively few addressed the entire agrifood system or aligned fully with the agreed 9b terminology, as shown in Figure 1 below. This imbalance should be considered during indicator refinement after COP 29 to ensure that indicators focused on supply, access, and nutrition are also well represented in the 9b pool.

Figure 4 Distribution of indicators by 9b target dimensions

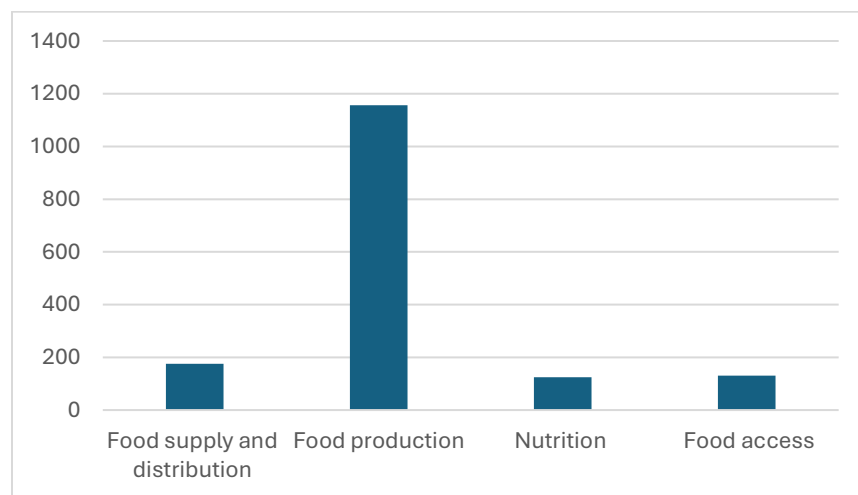


Table 1 further provides examples of broad categories of indicators or indicator themes under 9b corresponding to food production, supply and distribution, access and nutrition.

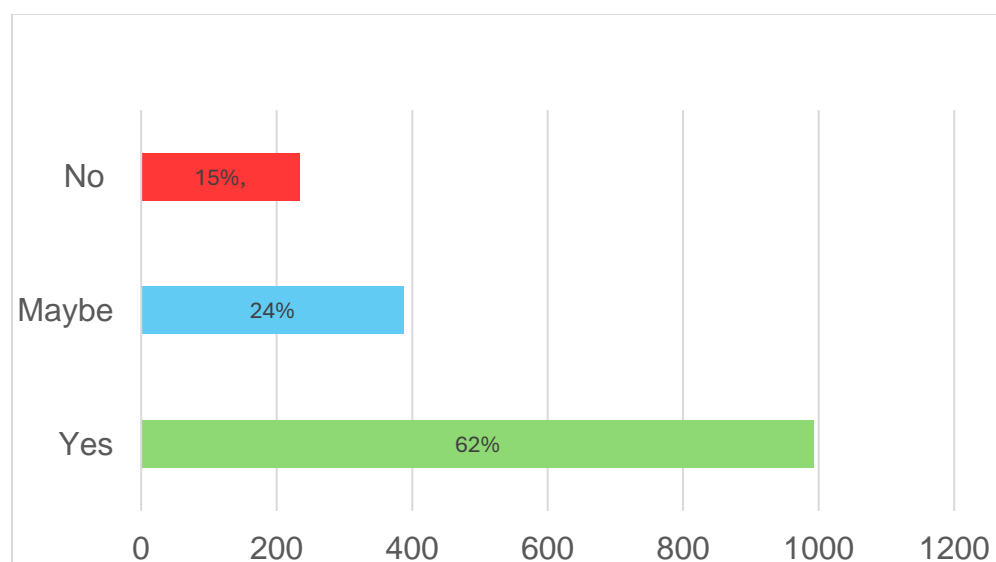
Table 1 Recurrent themes of indicators under 12a (9b)

| | Categories/ recurrent themes of indicators | Examples of indicators |
|------------------------------|--|---|
| Food production | Focus on production and income: Many indicators center on increasing agricultural production or productivity, improving yields, and raising the incomes of farmers and food producers. | Volume of production per labor unit by classes of farming / pastoral / forestry enterprise type" (Id 10), "Cereal yield variability change" (Indicator 33). |
| | Sustainable and climate-Resilient practices: A significant number of indicators emphasize sustainable agriculture practices | Number of climate resilient seeds adopted (Indicator 1663) |
| | Access to resources and infrastructure: for food production, such as water, irrigation, and climate information services. | Existence of functioning mechanism at local level to access adequate water resources for agriculture during scarcity/drought (id 30) |
| | Gender and social Inclusion: in food production systems. | Percentage population of women and marginal groups engaged in agricultural value chains in mountains (id 592) |
| Food supply and distribution | Infrastructure and access: indicators focus on the physical infrastructure and accessibility of food distribution networks, such as transportation, storage facilities, and market access. | "Length of roads (in km) built and improved to strengthen the access of mountain farmers to market and collection centers (Indicator 593). |
| | Efficiency and sustainability of food supply chains, including aspects like resource use, waste reduction, and sustainable practices. | Share of post-harvest losses (%) (id 4134), Food supply diversity (the range of food types available domestically (id 954) |
| | Resilience of food distribution systems to climate change impacts | Number of countries that factor climate into food procurement decisions for food in public settings (e.g., school meals and school feeding, health and care facilities), as well as safety nets and emergency programmes increased (id 1307). |
| | Food safety and quality: Some indicators focus on maintaining food safety and quality throughout the supply chain, including aspects like storage conditions, handling practices, and food contamination. | Number of food storage capacities in vulnerable areas are assessed identified (Indicator 6173) |
| | Production and availability: Several indicators track the production and availability of food, including domestic production, food imports, and food reserves. | "Share of national food grain needs satisfied by national production" (Indicator 1787), "Existence of food reserves, local purchases for relief programmes, EWS and food feeding programmes" (Indicator 3017). |

3.3. Relevance of the indicators to GGA concepts (12b)

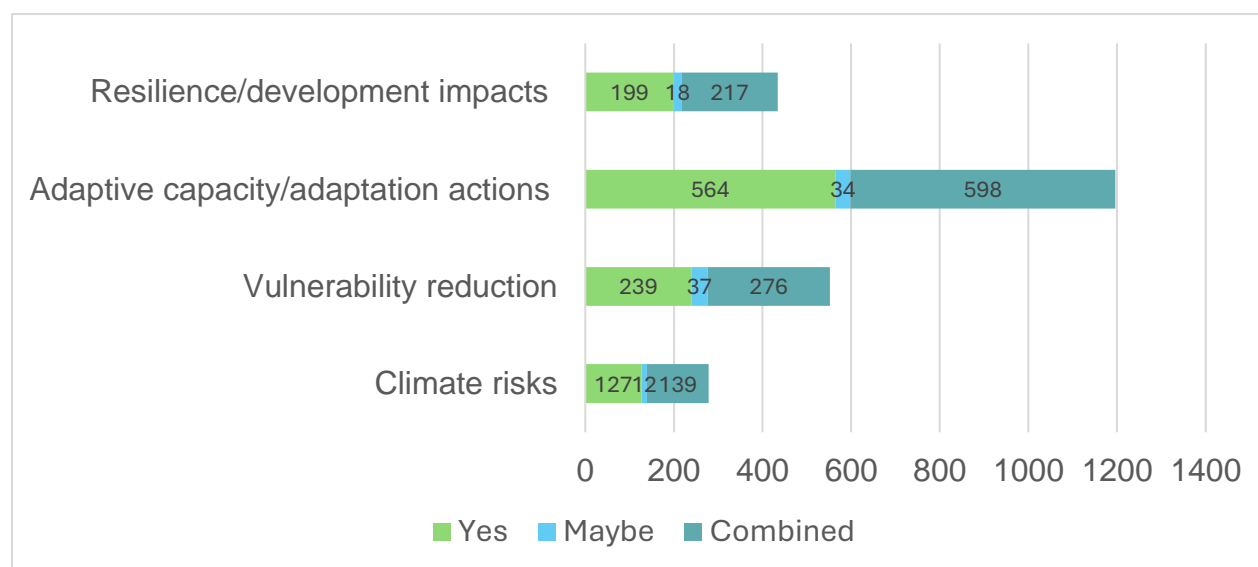
The common reasons for determining relevance under 12b—i.e., the specific relevance of indicators to adaptation, including enhancing adaptive capacity, strengthening resilience, and reducing vulnerability to climate change—are as follows. Indicators were categorized as “Yes” if they corresponded to the key GGA domains.

Figure 5: Proportion of indicators tagged as yes, no, maybe against SB Criteria12b and adaptation relevance



Most indicators categorized as 'Yes' addressed at least one of these four GGA domains. The tagging results show maximum indicators corresponding to the category “Adaptive capacity and actions” see figure below:

Figure 6 Indicator adaptation relevance (12b)



Some examples of indicators corresponding to the GGA domains, and their explanation is provided below in table 2 as an example of the decision points that the 9b-expert group made.

Table 2: Indicator themes under 12b, Adaptation relevance or GGA domains

| GGA domains | Categories/ recurrent themes of indicators | Examples of indicators |
|--|--|---|
| Vulnerability Reduction | Socioeconomic vulnerability For example: A farmer's income level is a strong indicator of their vulnerability. Higher incomes usually mean greater capacity to invest in climate adaptation measures, absorb losses from climate shocks, and recover more quickly. | "Average income of small-scale food producers, by sex and Indigenous status" (ID11). |
| | Ecological factors | "Number of plant and animal genetic resources for food and agriculture secured in either medium- or long-term conservation facilities (ID16)" |
| Adaptive capacity/adaptation actions. | Access to Resources and Infrastructure | "Existence of functioning mechanism at local level to access adequate water resources for agriculture during scarcity/drought" (ID 30) |
| | Investment and Financial Support | "The agriculture orientation index for government expenditures" (ID14) |
| | Knowledge and Capacity Building For example: this training would enable a community to plan for and implement measures that maintain production, allow for the regeneration of fish stocks under increasing climate risk | "No. of research conducted on agriculture/ fisheries adaptation measures, technologies developed." (ID 500) Indicator 4585: Community trained on sustainable fisheries activities. |
| | Policy and Governance | "Level of coordination of climate change adaptation actions in agriculture at national level" (ID 47) |
| 'Resilience/development impacts | Food security and nutrition | "Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)" (ID 438) |
| | Sustainable agriculture and resource Management. For example: Agropastoralists are usually smallholders and living in situations with marginal resources and access. Successful uptake of agroforestry approaches supports diversification of incomes and food production which will allow communities to respond to climate stresses on land and availability of feed. | "Sustainable fisheries as a percentage of GDP on small island states, LDC and all countries" (ID19) Indicator 6260: (Number of agro-pastoralists using agroforestry and conservation agriculture techniques to minimize climate and food insecurity risks). |
| | Economic Resilience | "Proportion of Agricultural sector (Ministry of Agriculture/ Fishery/Forestry) budget allocated for climate change adaptation" (ID54). |
| | Social Resilience | "Number or proportion of people (disaggregated by gender, indigenous status, disability status, age group) receiving tailored climate services for the agriculture sector, to inform agricultural resilience and adaptation actions" (ID 1322), |
| | Reduced losses and damage | Indicator: Percentage of livestock killed by drought Explanation: This is an impact indicator that quantifies the impacts of a climate risk factor - drought and the prolonged scarcity of water on livestock, which affect livestock health, exacerbates heat stress, and reduces the availability of feed. |

Indicators were classified under 'Maybe' for a variety of reasons. These include indicators that require further investigation, clarification, or refinement to determine their suitability for tracking progress on climate change adaptation in agriculture, food supply chain, food access and nutrition. Summary of reasons as below:

- **Unclear link to climate change adaptation:** Many "Maybe" indicators are broad and lack a clear, direct link to climate change adaptation. They might relate to agriculture or food access in general but do not specifically address climate risks or adaptation actions.

- *Examples:* "Food price volatility (id 2691)," "Percentage of registered state land optimally used (1973)"

Some indicators have an indirect or potential link to adaptation but need further clarification or refinement to confirm their relevance.

- *Examples:* "Area planted with fodder crops (ha) (id 1944) (i.e.) (could be relevant if fodder crops offer feed resilience)"

- **Need more specific information:** The relevance of some indicators depends on the specific context or how they are defined and measured. More information is needed to determine their suitability for tracking adaptation progress.

- *Examples:* "Present Conditions of Agriculture lands (id 1477)," "Number of agricultural extension workers" (relevant if they provide climate-related advice).

Some indicators could be relevant if disaggregated by factors like climate risk, adaptation practice, or vulnerable groups.

- *Example:* "Yield estimates" (could be relevant if analyzed in relation to climate risks or adaptation strategies).

- **Need for refinement or modification:** Some indicators need rewording or reframing to explicitly link them to climate change adaptation.

- *Examples:* "Number of farmers trained in new agricultural practices" (could be modified to "Number of farmers trained in climate-smart agriculture practices").

Indicators might need additional criteria to be relevant to adaptation.

- *Example:* "Number of livestock breeds" (could be relevant if it focuses on breeds adapted to drought or heat stress).

3.4. Cross-cutting considerations

It is essential to consider how the selection of indicators and the assessment of progress toward GGA targets connect with other climate change issues. However, capacity constraints (both human and time) limited the ability to explore these links in depth. Nevertheless, several indicators suggest these connections, indicating that this area warrants further exploration in future work. For example,

- Increased food production through enhanced water use might support adaptation in certain areas but conflict with essential water needs for human or animal consumption in others (e.g.,

indicators 1459, 111, 951, 1459, 1710, 1711, 2004, 2058, 2416, 2424, 3677, 3689, 3690, 3904, 4133, 4746, 4764, 5811).

- Increased yields of cereals or animal products tied to intensified input use could elevate the carbon footprint, conflicting with mitigation goals. For adaptation to be sustainable, production should emphasize management practices that minimize input use per unit area (e.g. indicators 10, 313, 957, 1796, 1872, 2794, 3237, 3775, 3851)
- Intensifying food production may compromise biodiversity and land conservation. Persistent environmental pressures, like deforestation or resource over-exploitation, could degrade natural capital, amplifying regional climate change impacts (e.g. indicators 1453, 1454, 1486, 1787, 5831, 5841) Indicators that solely focus on gross yield increases may be less effective in measuring sustainable adaptation progress. Indicators reflecting total factor productivity or sustainable productive growth provide a more accurate picture of adaptation outcomes.
- There are some indicators on which we need to discuss with other groups for more clarifications and placement under the most appropriate target. Examples: discussion with health group on ‘number of Mothers and Pregnant Women reached with Preventive Nutrition Services’; with ecosystems group on “The percentage of increase of vegetation covers for regions annually”.

4. Recommendations for discussions at COP 29 and priority work for 2025

To date, the food expert group analyzed the indicators under 9b target using criteria contained in paragraphs 12a and b of the SB60 conclusions. These indicators have been evaluated for their alignment with food and agriculture and their relevance to adaptation. This section outlines recommendations to optimize the work of the experts in refining indicators and fast track the establishment of indicators for the GGA targets. While the recommendations are based on our reflections working on indicators related to target 9b, we believe that they are applicable to the indicator refinement process in general.

Clarify intended output of the indicator refinement process: A key recommendation for COP29 is to prioritize discussions on the specific scope and nature of indicators that parties aim to establish for measuring progress in the GGA. Clarifying these aspects will be essential in guiding the indicator refinement process and ensuring that proposed indicators align with this shared ambition. Ideally, this specificity will help clarify the political expectations while allowing the experts to define an indicators refinement approach that will ensure that adaptation progress is effectively and meaningfully tracked.

Identifying patterns and grouping related indicators (Cross refer 3.3): Given the granularity and overlap among the indicators, a practical approach to creating a manageable set for global assessment is to establish a two-tiered indicator structure. This approach would involve grouping related indicators to form high-level categories, with additional, more specific indicators supporting each high-level category. This structure would allow for the aggregation of global adaptation progress while also capturing the unique adaptation priorities and outcomes of different contexts. Overarching themes could include key categories within food production, supply, distribution, access, and nutrition (aligned with Target 9b; see

Table 1). Additionally, specific agrifood indicator categories could highlight adaptation actions and outcomes within similar thematic areas.

Define additional criteria to further categorize and refine indicators: While the initial criteria have supported the mapping and prioritization of indicators, experts recommend applying additional criteria to further guide the identification of relevant indicators. This includes considering: Indicator type/function (input, process, output, outcome, impact). The rest of the criteria in paragraph 12 would also be useful to further refine and prioritize indicators within a category by considering data readiness, clarity of methodologies associated with indicators, ability to disaggregate or aggregate data, and incorporation of traditional knowledge, indigenous peoples' knowledge, and local knowledge systems.

Adopt a systematic approach to indicators mapping to identify and address gaps: By mapping indicators to the specific elements of Target 9b and relevant GGA dimensions, we have highlighted the limitations of a simple 'yes,' 'no,' or 'maybe' classification system. Our findings reveal an imbalance in indicator coverage, underscoring the need for additional indicators to fully capture each target's elements and dimensions of the GGA as per Article 7.1 of the Paris Agreement. For instance, further refinement should expand beyond food production to include indicators reflecting the broader agrifood system, particularly in areas like supply, access, and nutrition. Considering the predominant role of smallholders in agriculture, indicators should also address livelihood and income security as part of resilience building, as well as the diversity of enabling conditions and resources required for adaptation. As such, while defining a streamlined approach for expert groups is important for consistency, it is equally crucial that the guidance provided is comprehensive to cover all essential aspects.

Carefully assess and manage duplicate indicators (refer 3.1). In cases where duplicates are submitted by different agencies, these may reflect the strength and consensus around certain core indicators and should be retained and prioritized in the refinement process. However, when duplicates are submitted by the same party across different submission categories (such as AGN, LDC, and AC), they should be flagged as double counting. To improve the database's accuracy and relevance, it is recommended that the Secretariat systematically identify and remove redundant duplicates after COP 29, thereby streamlining the indicator set for effective global assessment.

Address cross-cutting indicators: There were many indicators that cross-cut other GGA target areas, notable water, ecosystems, and poverty and livelihoods. This was particularly salient for the natural resource base – land, water and ecosystems – that underpin agricultural production. Smallholders have higher than average exposure to climate risk to natural resources, and high levels of vulnerability. There is a need for an agreed methodology across the target areas to address cross-cutting indicators, especially water-food, ecosystems-food, agriculture-poverty-livelihoods and food-poverty interactions. It is also paramount to create time and space for experts to discuss with other relevant expert groups to clarify certain crosscutting indicators and determine their most appropriate targets. For example, collaborate with the health group regarding the indicator on the “number of mothers and pregnant women reached with preventive nutrition services,” and with the ecosystems group on “Percentage of conservation practitioners aware of climate change impacts on ecosystems (4477)”, “# of community watershed/rangeland plans integrating endogenous adaptation practices (4500)”. There are also several indicators for Target 9b that were also tagged to the policy cycle (target 10).

Steps to refining indicators: To refine indicators, the first step is to enhance measurability by reviewing those that, while relevant, are currently too complex or abstract to measure effectively. By simplifying or reframing these indicators, we can make them more actionable and quantifiable. For example, indicators such as “Remuneration or compensation for lands traditionally used,” “Stabilization of the agricultural frontier,” “Sustainable practices in agricultural production,” and “Strength of public-private partnerships in climate adaptation” require clearer definitions. Additionally, indicator refinement should focus on increasing climate relevance, ensuring that each indicator aligns with and effectively tracks progress in climate adaptation. While several current indicators focus on outputs, which provide valuable insights into immediate or short-term actions, in further refinement a stronger emphasis on impact and outcome indicators is necessary for meaningful adaptation measurement. Shifting toward assessing development outcomes will offer a more robust view of adaptation progress, as output indicators often reflect activities rather than the long-term resilience and adaptive capacity essential for agrifood systems.