Submission of Information on Existing Indicators for Measuring Progress Towards the Target in 2/CMA.5 Paragraph 9(b) and Gaps

Overview

This submission provides information on food systems indicators and their applicability to the targets of the global goal on adaptation, as agreed in decision 2/CMA.5 paragraphs 9-10, with a specific focus on the target in 2/CMA.5 paragraph 9(b).

As agreed at SB 60 (FCCC/SB/2024/L.6), the work under the the UAE - Belém work programme contributes to the purpose of the UAE Framework for Global Climate Resilience (UAE FGCR) as defined in 2/CMA.5 para 7. There are two aspects of this purpose: to guide the achievement of the global goal on adaptation (GGA) and the review of overall progress in achieving it. As such, indicators should be relevant to at least one of these objectives.

Section I discusses food systems-related elements of the GGA which indicators must address.

Section II provides information on how existing indicators including those under the Sustainable Development Goals, Kunming-Montreal Global Biodiversity Framework, and Sendai Framework for Disaster Risk Reduction might provide coverage for these elements.

Section III provides an appendix assessing in more detail the suitability of indicators mapped in section II, as well as other indicators that were examined but not discussed in section II for reasons such as issues in methodology or data quality.

I. Food Systems Elements of the GGA

A. Paragraph 9(b): Elements

Paragraph 9(b) of 2/CMA.5 sets a food and agriculture thematic target**:** *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.* This contains several elements:

- *Attaining climate-resilient food and agricultural production and supply and distribution of food*
- *Increasing sustainable and regenerative production*
- *Increasing…equitable access to adequate food and nutrition for all*

Each of these elements contains multiple dimensions which indicators should cover. In some cases, one indicator may be relevant across several of these dimensions or elements.

Attaining climate-resilient food and agricultural production and supply and distribution of food: indicators should sufficiently address climate impacts in terms of both shocks and slow onset events and should cover production, supply, and distribution of food. Indicators should be sensitive to trends in both local and systemic resilience.

Increasing sustainable and regenerative production: indicators should be sufficient to account for multidimensional environmental, social, and economic elements of sustainability including pollution, GHG emissions, water use, biodiversity impacts, gender equality, livelihoods, Indigenous Peoples' rights, and animal welfare.

Increasing…equitable access to adequate food and nutrition for all: indicators should account for the adequacy of food and nutrition (with sensitivity to dietary, energy, and macro/micro nutrient needs), issues of equitability including age, gender, Indigenous status, and transboundary considerations, as well as being sensitive to climate impacts across these dimensions.

II. Existing indicator mapping

A. Summary of good suitability indicators

The table below provides a summary of **good suitability existing indicators and the element of 2/CMA.5 para. 9(b) for which they are proposed.**[1]

Indicator	9(b) element		
	Attaining climate-resilient food and agricultural production and supply and distribution of food	Increasing sustainable and regenerative production	Increasing…equitable access to adequate food and nutrition for all
SDG 2.1.2 Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)			x
SDG 2.2.2 Prevalence of malnutrition among children under 5 years of age - wasting			x
SDG 2.2.3 Prevalence of anaemia in women aged 15 to 49 years, by pregnancy status			x
Availability of fruits and vegetables in a country's food supply per capita per day (FSCI 1.1)			x
Per person cost of a healthy diet (FSCI 1.1.a)			x
Percent population who cannot afford a healthy diet (FSCI 1.2.c)			x
SDG 5.a.1 (a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure		x	
SDG 14.b.1 Degree of application of a legal/regulatory/ policy/institutional framework which recognizes and protects access rights for small-scale fisheries		x	

[1] These are primarily mapped to the element for which they are most appropriate (or more than one element where a portion of the indicator is *uniquely* applicable to a different element).

SDG 14.4.1 Proportion of fish stocks within biologically sustainable levels		x	
SDG 12.3.1 (a) food loss index	x	x	
SDG 12.3.1 (b) food waste index	x		
SDG 2.5.1 Number of (a) plant and (b) animal genetic resources for food and agriculture secured in either medium- or long-term conservation facilities	x		
Dietary sourcing flexibility index	x		

Please see Appendix III.A and III.B for further detail and commentary on the suitability of existing food-systems related indicators.

B. Coverage of 9(b) elements and gaps

1. *Climate resilience throughout the food system*

Several existing indicators cover key measures of climate resilience.

Resilience to climate shocks.
A number of factors can determine the resilience of production, distribution, or supply to climate shocks.[2] One of the key features for resilience is diversification (both in sourcing pathways as well as varietal) as it is important for healthy diets, distributes risk to reduce vulnerability, and supports adaptive capacity by providing options for both autonomous and public adaptation. At the same time, climate change impacts such as increases in extreme weather events and diseases are eroding agricultural diversity. For sourcing pathways, the **dietary sourcing flexibility index**, developed by FAO and tracked through the Food Systems Countdown Initiative, supports monitoring the diversity of sourcing pathways of food commodities from domestic production, food imports and available stocks, measuring the capacity of food systems to ensure the availability of food necessary for a nutritious diet. It should be noted that the dietary sourcing flexibility index does not assess how easily the supply chain might recover from shocks.

SDG Indicator 2.5.1(a) **SDG 2.5.1 Number of (a) plant and (b) animal genetic resources for food and agriculture secured in either medium- or long-term conservation facilities** provides a valuable measurement on the conservation of genetic diversity in genebanks—which help protect against the irreversible loss of diversity from climate impacts and also support the development and deployment of more resilient agricultural resources.[3] However, with regard to measuring varietal diversity 'in-field' (for example of crop species and varieties) another important component of diversity, there appears to be a gap in existing indicators.

More broadly, although it is not climate-specific (and if data quality improves), **UNDRR C-2 Direct agricultural loss attributed to disasters** could provide a useful indication of observed vulnerability at the production level.

Systemic food supply resilience to slow onset events.
One of the key challenges that slow onset events pose for food systems is declining capacity to supply adequate food due to, for example, declining yields, increasing losses, and decreasing availability and integrity of underlying resources such as land and

[2] *See generally*, IPCC, *Climate Change and Land, an IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems*, ch. 5 (2019), https://www.ipcc.ch/srccl.
[3] See, e.g., M. Smale, and N. Jamora, *Valuing genebanks*, Food Security 12, no. 5 (2020): 905-918, https://link.springer.com/article/10.1007/s12571-020-01034-x.; H. Dempewolf et al., *Our shared global responsibility: Safeguarding crop diversity for future generations*. Proceedings of the National Academy of Sciences, 120(14) (2023) https://doi.org/10.1073/pnas.2205768119.

water.[4] As the IPCC notes, both supply and demand-side measures will be needed to address this.[5] This will require addressing: (i) efficiency in production; (ii) lost and wasted food before and after the 'farm-gate'; and (iii) shifts towards less resource intensive food types to ensure integrity of supply.

(i) Efficiency of production
We consider indicators relevant to more efficient production, below, under the element "[i]ncreasing sustainable and regenerative production."

(ii) Food loss and waste
Food loss and waste is essential to track because climate change poses key risks to increases of food loss and also because food loss and waste raises the food supply burden on the food system as a whole. **SDG 12.3.1 (a) food loss index** and **SDG 12.3.1 (b) food waste index** are both relevant existing indicators. While there are gaps in data, the indicators nevertheless provide global and regional estimates. The food loss index is also relevant for the element of sustainable and regenerative production because it accounts for some losses 'on-farm' (those that take place post-harvest).

(iii) Resource intensiveness of foods
While improvements in production practices are necessary for reducing the resource-intensiveness of the food supply, these will not be sufficient without also addressing the types of foods that are produced.[6] For measuring less resource-intensive food types, the key variable is excess consumption of animal products due to their near categorically greater resource intensiveness.[7] There is a need for the development of an indicator in this area, but it is conceptually feasible. We recommend estimating the percent of the global population consuming (or number of countries with per capita consumption of) animal protein in excess of any nutritional benefits (this could be based on the quantitative recommendations in the EAT-Lancet Commission Planetary Health diet.[8])

2. *Sustainable and regenerative production*

As there are multiple aspects to consider in assessing whether production is sustainable and regenerative, multiple indicators or sub-indicators will be necessary to effectively track this element. These should cover key aspects of the environmental, social, and economic dimensions of sustainability.

While there is an existing indicator, **SDG 2.4.1 Proportion of agricultural area under productive and sustainable agriculture**, that is intended to function in a way that overlaps with this element, (as well as a SDG 2.4.1 proxy indicator developed due to lack of data availability), we do not recommend the use of these for a number of reasons detailed below, including the lack of data availability for SDG 2.4.1, issues with the methodologies of certain sub-indicators, and conceptual limitations by using land area as a denominator for the indicator.

Environmental impacts - GHG emissions.
GHG emissions from food production are critical to monitor as an element of sustainable production because of their scale and impact on the food system through contribution to climate change. An indicator on GHG emissions from food production would be

[4] IPCC, *Climate Change 2022: Impacts, Adaptation and Vulnerability*, FAQ 5.3 (2022), https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_FullReport.pdf.
[5] IPCC, *Climate Change and Land, an IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems*, 5.3.4 (2019), https://www.ipcc.ch/srccl.
[6] IPCC, *Climate Change and Land, an IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems*, 5.3.4 (2019), https://www.ipcc.ch/srccl.
[7] See J. Poore and T. Nemecek. *Reducing food's environmental impacts through producers and consumers*. Science 360.6392 (2018): 987-992; IPCC, Climate Change and Land, an IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems, 5.3.4 (2019), https://www.ipcc.ch/srccl.
[8] *See* https://eatforum.org/content/uploads/2019/07/EAT-Lancet_Commission_Summary_Report.pdf.

effective for tracking progress in this area as the overall quantity of emissions is the key variable for sustainability in this area.[9] Data for this element could be drawn and aggregated from, for example, National Inventory Reports.

Environmental impacts - water pollution.
Agricultural practices are a principal determinant of water quality. **Nitrogen use efficiency** can provide an indication of the extent to which fertilizers and manure are likely to contribute to water pollution, with data available from FAOSTAT. However, an indicator for this dimension of sustainability could also be appropriately reflected in reference to 9(a).

Social - gender.
SDG 5.a.1 (a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure are both conceptually suitable as indicators but face significant shortfalls in data availability. As a result, it would be worth considering whether these gaps can easily be remediated or whether there is a need to develop a new indicator.

Social - Protection of Indigenous Peoples.
Agricultural policies can both frequently impact the rights of Indigenous Peoples as well as benefit from their knowledge. There does not appear to be a strong existing indicator for measuring the equitability of food systems with reference to Indigenous Peoples, demonstrating a need for new indicator development. An indicator could track the number of countries with regulations applicable to agriculture for ensuring Free, Prior, & Informed Consent of Indigenous Peoples.

Social - Animal welfare & health.
Currently, although animal welfare is a recognized element of sustainable production, there is a gap in indicators to cover this element. This would also have applicability to climate resilient production as animals in production are impacted by climate change. An indicator could be developed to monitor this based on the number and type of animal welfare regulations by country, with data available from FAOLEX.

There is also increasing evidence that improving animal health can play a significant role in reducing emissions intensities from livestock production.[10] An indicator to help measure progress toward improved animal health could be 'Numbers of countries with active animal disease and parasite control programs.'

Economic/social: Feed-food-fuel competition.
In line with the Paris Agreement, the fundamental priority of food production should also be recognized in the context of competing use of food system resources. Feed-food-fuel competition is one of the major topics.[11] While we are not aware of an existing indicator on this, it is a necessary area for indicator development as production should not be considered sustainable if it undermines the provision of adequate food. An indicator on the proportion of agricultural production for direct human consumption could draw data from FAOSTAT production value data with adjustments to account for multiple use crops (such as maize and soy).

Economic dimensions:
Net farm income, one of the SDG 2.4.1 sub-indicators, can provide a measure for the profitability of farming. However, there is a gap in indicators that provide a clearer measure of the economic benefits to people. SDG 2.3.2 Average income of small-scale food producers, by sex and indigenous status is conceptually relevant, but data is very limited.

Indicators of specific relevance to aquatic food production.
Some of the existing indicators, discussed for sustainable and regenerative production above, are not applicable to aquatic food production. For some of the others, applicability is limited—for example, existing data on GHG emissions from aquatic marine food

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[9] See Crippa, M et al., *Food Systems Are Responsible For A Third Of Global Anthropogenic GhG Emissions*, Nature Food 2, 198–209 (2021) (estimating pre-farm gate emissions of 2015 5.7 Gt CO2e yr−1 from LULUCF and an additional 7.1Gt CO2e yr−1 from other aspects of the production stage including inputs); *Emissions Gap Report 2022: The Closing Window — Climate Crisis Calls for Rapid Transformation of Societies*, United Nations Environment Programme (2022), 57, https://www.unep.org/emissions-gap-report-2022 (noting GHG reduction at all stages of the food system, including production is necessary for a 2 ℃ pathway).

[10] See FAO. 2023. Pathways towards lower emissions – A global assessment of the greenhouse gas emissions and mitigation options from livestock agrifood systems. Rome https://doi.org/10.4060/cc9029en

[11] See Mottet, A., de Haan, C., Falcucci, A., Tempio, G., Opio, C., & Gerber, P. (2017). Livestock: On our plates or eating at our table? A new analysis of the feed/food debate. *Global food security*, *14*, 1-8. https://doi.org/10.1016/j.gfs.2017.01.001

production may contain significant gaps, in particular in relation to emissions from sediment disruption as well as marine biogeochemical cycling processes.

As small-scale fisheries are linked to particular social and economic benefits, SDG 14.b.1 Degree of application of a legal/regulatory/ policy/institutional framework which recognizes and protects access rights for small-scale fisheries would be useful as a measure of sustainability. Additionally, SDG 14.4.1 Proportion of fish stocks within biologically sustainable levels can help track whether overfishing is taking place, a key issue for sustainability.

There is currently a gap, as recognized by the CBD AHTEG,[12] in coverage of indicators for aquaculture sustainability.

3. Equitable access to adequate food and nutrition

Indicators tracking this element should ensure adequate quantity and quality of food and nutrition and the equitability of distribution.

SDG indicator 2.1.2 Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES) provides good data on food availability—however, it is not specific to climate and is not very nutrition-sensitive (for reasons discussed in the *Appendix*, however, it would be a better choice for a similar function than SDG 2.1.1 Prevalence of Undernutrition). A good complementary indicator for more climate and nutrition sensitivity would be **availability of fruits and vegetables in a country's food supply per capita per day** as consumption of these foods is essential, there are negligible risks of overconsumption and it is the food group with the most widespread global shortage currently and while being highly susceptible to climate impacts. This Indicator is tracked under the Food Systems Countdown Initiative (FSCI 1.1.b).

As gender is a critical dimension of equitability in nutrition, we recommend SDG 2.2.3 Prevalence of anaemia in women aged 15 to 49 years, by pregnancy status (percentage). However as this indicator is affected by non-nutrition issues and interventions also, this should also be paired with a food consumption indicator, like the one suggested above, to understand progress.

Diet quality is a critical component linking adequate food with adequate nutrition. Poor diet quality can lead to different forms of malnutrition, including wasting and being overweight. As child growth is an internationally accepted outcome reflecting child nutritional status, with child overweight and wasting in children associated with inadequate access to foods that support healthy dietary patterns, we recommend SDG 2.2.2 Prevalence of malnutrition among children under 5 years of age as a suitable indicator for monitoring and guiding action on these elements.

Making nutritious foods more widely affordable is a necessary, though insufficient, precondition to ensure more equitable access to food and nutrition, enabling people to choose, prefer, and consume healthy diets. For this reason, **FSCI indicators** 1.1.a Per person cost of a healthy diet and 1.2.c Percent population who cannot afford a healthy diet are useful indicators of people's economic access to nutritious foods and healthy diets.

III. Appendix: Existing Indicators and assessment in usage under global intergovernmental frameworks and assessment

A. Existing Indicators in usage under global intergovernmental frameworks

The table below compiles and analyzes food-systems related indicators under the Sustainable Development Goals, Sendai Framework for Disaster Risk Reduction, headline indicators for the Kunming Montreal Global Biodiversity Framework, as proposed at SBSTTA 26 (or proposed for consideration for adoption) at CBD COP16 (CBD/SBSTTA/26/L.10). Indicators from UNCCD were reviewed but have not been included as they are not food or agriculture-specific.

Food systems-related indicators under the SDGs, CBD, and Sendai Framework.		
Indicator and background information	**Framework**	**Comments**

[12] CBD/SBSTTA26/INF/19.

Good suitability		
SDG 2.1.2 Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES) **Overview**: This indicator estimates the percentage of the population that has experienced moderate or severe food insecurity using survey questions that focus on barriers to food access due to insufficient money or resources. **Methodology**: see metadata	SDG 2.1.2	Some suitability for review of Equitable access to adequate food and nutrition, bearing in mind that due to the focus of the questions the scores likely predominantly reflect quantity of food access rather than quality. As it reflects primarily non-climate variables, it would be less relevant as an indicator for climate resilience.
SDG 2.2.2 Prevalence of malnutrition (weight for height >+2 or <-2 standard deviation from the median of the WHO Child Growth Standards) among children under 5 years of age, by type (wasting and overweight) **Overview**: Estimates, based on household surveys and other sources height for age > ± 2 standard deviation from the the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age. **Methodology**: see metadata	SDG 2.2.2	Suitable for monitoring Equitable access to adequate food and nutrition and guiding action.
SDG 2.2.3 Prevalence of anaemia in women aged 15 to 49 years, by pregnancy status (percentage) **Overview:** Indicator estimates the percentage of women aged 15–49 years with haemoglobin concentrations below certain levels dependent on whether pregnant, non-pregnant, lactating, altitude and smoking, with data from laboratory or field testing. **Methodology:** see metadata	SDG 2.2.3	Suitable for review and guiding action on *Equitable access to adequate food and nutrition* as it links strongly with equity and links closely (though not exclusively) with nutritional adequacy.
SDG 2.5.1 Number of (a) plant and (b) animal genetic resources for food and agriculture secured in either medium- or long-term conservation facilities **Overview:** The plant component is calculated as the number of accessions of plant genetic resources secured in conservation facilities under medium- or long-term conditions, where an 'accession' is defined as a distinct sample of seeds, planting materials or plants The animal component is calculated as the number of local (i.e. being reported to exist only in one country) and transboundary (i.e. being reported to exist in more than one country) breeds with material stored within a genebank collection with an amount of genetic	SDG 2.5.1; GBF A (complementary), 4 (component), 9 (complementary).	As genetic resources support adaptive capacity, this indicator could support monitoring and action with respect to climate resilient food and agricultural production.

material which is required to reconstitute the breed in case of extinction. **Methodology:** see metadata for 2.5.1(a) and metadata for 2.5.1(b).		
SDG 5.a.1 (a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure **Overview:** these indicators estimate, based on survey data, the percentage of people living in a household where at least one member operates agricultural land or livestock as an own-account worker that (a) that have land ownership or rights and (b) the percentage of these that are women. **Methodology:** see metadata	SDG 5.a.1 (a) , GBF 22 (component)	Both of these indicators measure important and actionable aspects of sustainable and regenerative production. Data is currently very limited but this may be addressable.
SDG 12.3.1 (a) food loss index **Overview:** Measures losses from harvest up to, and not including, retail for five food groups and 10 commodities. **Methodology:** see methodology and metadata	SDG 12.3.1 (a)	Food losses are relevant to monitor as they are both impacted by slow-onset events and shocks and affect systemic resilience to climate change by increasing production needs. This would be relevant for monitoring and guiding action on climate resilient supply and distribution of food, with lesser relevance to climate-resilient food and agricultural production or sustainable and regenerative production because the indicator focus tracks post-harvest losses. There are significant gaps in country-level data at present, but the indicator can still provide estimates with relevance at the regional or global level based on available data and data is likely to improve further.
SDG 12.3.1 (b) food waste index **Overview:** Measures losses from harvest up to, and not including, retail for five food groups and 10 commodities. **Methodology:** see methodology and metadata	SDG 12.3.1 (b); GBF 16 (component)	Food waste is relevant to monitor as it is both impacted by slow-onset events and shocks and affects systemic resilience to climate change by increasing production needs. This indicator would be relevant from a systemic burden point of view to climate resilient supply. While data is currently limited, there is at least partial data from over half of countries with data availability improving rapidly in recent years.[13]
SDG 14.b.1 Degree of application of a legal/regulatory/ policy/institutional framework which recognizes and protects access rights for small-scale fisheries **Overview**: Indicator provides a numerical score based on sub-criteria within the areas of (1) laws, regulations, policies, plans or strategies that specifically target or address the small-scale fisheries sector? (2) whether there are any ongoing specific initiatives to implement the SSF Guidelines; and (3) if there	SDG 14.b.1	Small scale fisheries are particularly relevant to track as an element of sustainable and regenerative production because of the particular issues they can face under increasingly limited resources under climate change and because of their greater contributions to social and economic progress than industrial fisheries. While there are data gaps, some data is available for most countries.

[13] https://wedocs.unep.org/bitstream/handle/20.500.11822/45230/food_waste_index_report_2024.pdf?sequence=5&isAllowed=y.

is an advisory/consultative body to the Ministry/Department of Fisheries in which fishers/fish workers can participate and contribute to decision-making processes? **Methodology**: see metadata		
SDG 14.4.1 Proportion of fish stocks within biologically sustainable levels **Overview:** Indicator is calculated as the ratio between the number of exploited fish stocks classified as "within biologically sustainable levels" and the total number of stocks in the reference list that were classified with a determined status (within/not within "biologically sustainable levels") **Methodology:** see metadata	SDG 14.4.1, GBF 5.1 (headline)	Indicator could be suitable as an element of sustainable and regenerative production and of climate resilient supply as it directly assesses the sustainability of fish stocks but it could be improved by mandating data collection (satellite monitoring, electronic catch reporting, onboard observers, etc.), including periodic assessments to respond promptly to any signs of overfishing or ecological imbalance.
Some suitability (limitations in either relevance or data)		
SDG 2.c.1 Indicator of food price anomalies **Overview:** This indicator, in sum, tracks the proportion of countries experiencing moderately or abnormally high food prices (for one series, a food basket of cereals and commodities, determined at national levels) in comparison with historical trends and for a consumer food price index. **Methodology**: see metadata	SDG 2.c.1	Some suitability for the review of climate-resilient food and agricultural production and supply and distribution of food as price deviations can result from systemic vulnerabilities and may serve as a proxy for lack of resilience to climate shocks. However, data will reflect many non-climate variables and other indicators will, as a result, be more likely suitable for guiding action. Not strongly suitable for Equitable access to adequate food and nutrition as it doesn't measure access or indicate if prices are chronically unaffordable and is not nutrition-sensitive.
SDG 2.1.1 Prevalence of undernourishment **Overview:** This indicator estimates the percentage of the population "whose habitual food consumption is insufficient to provide the dietary energy levels that are required to maintain a normal active and healthy life." **Methodology: see** metadata	SDG 2.1.1	Some conceptual relevance to Equitable access to adequate food and nutrition. However, the focus on dietary energy is narrow and the methodology of modeling insufficient dietary energy based on expected distribution of calories risks overlooking climate driven changes to food access as well as interventions to improve food access. Further, as the metadata notes, there are significant data gaps. For that reason, SDG 2.1.2 Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES) is likely to be a better option. As it relates to primarily non-climate variables, it would not be useful as a measure of climate resilience.
SDG 2.2.1 Prevalence of stunting (height for age <-2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age **Overview:** Estimates, based primarily on surveys of prevalence of stunting (height-for-age <-2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age. **Methodology:** see metadata	**S**DG 2.2.1	Some suitability as a component for review of Equitable access to adequate food and nutrition and guiding action and fairly good data availability (sufficient data for calculation from ~80 percent of countries (*see* metadata)). However, this also reflects non-nutrition variables and progress towards this variable may not provide sufficient timely indications for the climate policy cycle.

SDG 2.3.1 Volume of production per labour unit by classes of farming/pastoral/forestry enterprise size **Overview:** This indicator estimates the value of production per labour unit operated by small-scale producers in the farming, pastoral and forestry sectors. **Methodology**: see metadata	SDG 2.3.1; GBF 9 (complementary)	Conceptually suitable as a component for measuring review of Increasing sustainable or regenerative production. However, data is highly limited and this would need to be paired with other indicators to avoid encouraging unsustainable practices by narrowly focusing on productivity increases.
SDG 2.3.2 Average income of small-scale food producers, by sex and indigenous status **Overview**: Indicator estimates annual per capita income from crop, livestock, fisheries, aquaculture production, and forestry production for those in the bottom 40 percent in each of the categories of area of land operated, number of livestock operated, and share of revenue agricultural production . **Methodology**: see Metadata	SDG 2.3.2, GBF 10 (component)	Conceptually good suitability for sustainable and regenerative production, but very limited data.
SDG 14.6.1 Degree of implementation of international instruments aiming to combat illegal, unreported and unregulated fishing **Overview:** Based on a questionnaire, provides a score on various criteria of national adherence and implementation of the the 1982 United Nations Convention on the Law of the Sea; 1995 United Nations Fish Stocks Agreement; the 2009 FAO Agreement on Port State Measures (PSMA); development and implementation of a national plan of action (NPOA) to combat IUU fishing in line with the IPOA-IUU; and Implementation of Flag State Responsibilities in the context of the 1993 FAO Compliance Agreement and FAO Voluntary Guidelines for Flag State Performance. **Methodology:** see metadata	SDG 14.6.1; GBF 5 (component), 9 (complementary)	Potentially suitable with modifications for monitoring sustainable and regenerative production. However, the indicator's current methodology is out of date as it does not include critical developments, in particular the WTO subsidies agreement on IUU and ongoing negotiations related to capacity-enhancing subsidies and there may be limited practical value added to incorporating this indicator under UNFCCC.
UNDRR C-2 Direct agricultural loss attributed to disasters. **Overview:** Indicator measures losses to agriculture due to disasters. Agriculture is understood to include the crops, livestock, fisheries, apiculture, aquaculture and forest sectors as well as associated facilities and infrastructure. **Methodology**: see Technical Guidance for Monitoring and Reporting on Progress in Achieving the Global Targets of the Sendai Framework for Disaster Risk Reduction	UNDRR C-2	Some conceptual suitability for measuring climate resilient food and agricultural production although it will also reflect non-climate disasters such as earthquakes and data availability is low.
Value of subsidies and other incentives harmful to biodiversity, for agriculture sector **Overview:** this indicator uses the OECD database on Producer Support Estimate to	GBF 18.2 headline, disaggregation	Some conceptual suitability for monitoring sustainable and regenerative production; however, "harmful for biodiversity" does not necessarily equate to all negative environmental impacts. Additionally, the actual impact of subsidies and incentives on biodiversity (and more broadly, the environment) depends on a variety of other factors that

gather data on government support to agriculture and refers to 3 main subsidies and/or incentives identified by the OECD as potentially most harmful to environment and biodiversity. **Methodology** see metadata		determine the aggregate degree of producer responsiveness to policy changes.
Not suitable		
SDG 2.a.1 The agriculture orientation index for government expenditures **Overview:** this indicator tracks "the Agriculture share of Government Expenditure, divided by the Agriculture value added share of GDP, where Agriculture refers to the agriculture, forestry, fishing and hunting sector". **Methodology:** see metadata	SDG (2.a.1)	Would not be suitable for review as it is not directly related to any of the 9(b) elements. Indicator would also not be effective for guiding action because it would not indicate level of government support (as it is dependent on spending on other sectors) or quality of action.
SDG 2.a.2 Total official flows (official development assistance plus other official flows) to the agriculture sector **Overview:** this indicator tracks total official flows (official development assistance plus other official flows) to the agriculture sector in developing countries. **Methodology:** see metadata	SDG 2.a.2	Not suitable for the review of any of the 9(b) elements because of lack of topical relevance. Some relevance for guiding action because of the importance of MOI, however a purely quantitative indicator such as this one will be limited in reflecting whether the assistance is beneficial, particularly in relation to elements of the GGA.
SDG 2.b.1 Agricultural export subsidies **Overview:** This indicator tracks budgetary outlays and quantities as notified by WTO Members in Tables ES:1 and supporting Tables ES:2. **Methodology:** see metadata	SDG 2.b.1	Not topically specific to any of the 9(b) elements to be relevant for review. Not suitable for guiding action because of mixed relationships between indicator direction of travel and achievement of 9(b) elements.
SDG 2.4.1 Proportion of agricultural area under productive and sustainable agriculture **Overview**: Estimates proportion of land meeting certain thresholds for all 11 sub-indicators (Farm output value per hectare, Net farm income, Risk mitigation mechanisms, Prevalence of soil degradation, Variation in water availability, Management of fertilizers, Management of pesticides, Use of agro-biodiversity-supportive practices, Wage rate in agriculture, Food Insecurity Experience Scale (FIES), Secure tenure rights to land) Each of these sub-indicators has its own metadata, as described in the methodology. Due to data scarcity, a proxy indicator has been approved (see below)	SDG 2.4.1, GBF 10.1 (headline)	Some sub-indicators may be useful to consider for Sustainable and regenerative production. However, the use of this indicator is not recommended because: -data is so widely unavailable that a proxy indicator has now been approved for usage instead; -the lack of sensitivity to extent of unsustainability combined with use of land area as a denominator will prevent clear conclusions from the data -the lack of systemic perspective in sub-indicator methodologies that fail to consider upstream impacts (such as reliance on unsustainable inputs) or downstream impacts (whether outputs contribute to improved food security and nutrition) -the lack of inclusion of sub-indicators related to UNFCCC-critical dimensions of sustainability including deforestation and GHG emissions.

Indicator 2.4.1 - Proportion of agricultural area under productive and sustainable agriculture (Proxy) **Overview**: Measures current status and trends on seven sub indicators. Each of these indicators is assessed from 1 to 5 (with five indicating "Improvement towards productive and sustainable agriculture" or "Productive and sustainable agriculture already achieved") • Gross production value per hectare • Gross output diversification • Nitrogen use efficiency • Agriculture component of water stress • GHG emissions intensity in agriculture • Agricultural value added per worker • Informal employment in agriculture **Methodology:** see metadata and methodology	SDG 2.4.1 (Proxy)	While this proxy addresses the data availability issues, it will not helpfully contribute to the review of increasing sustainable and regenerative production because of issues with a number of the sub-indicator methodologies. For example, the calculation method for the GHG emissions intensity sub-indicator divides GHG emissions from on-farm activities by the gross value of the product—this will result in misleading conclusions that may result in maladaptation and disadvantage smallholders—for example, a livestock farm that grows its own fodder will show as significantly more emissions-intensive than one that buys fodder. These issues appear for other sub-indicators such as gross production value per hectare also.
SDG 2.5.2 Proportion of local breeds classified as being at risk of extinction **Overview:** This indicator estimates the percentage of local livestock breeds among local breeds with known risk status classified as being at risk of extinctions at a certain moment in time, as well as the trends for this percentage. **Methodology:** see metadata	SDG 2.5.2; GBF A (complementary); 4 (component), 10 (complementary)	Not suitable due to limited topical relevance and extensive data gaps.
SDG 14.7.1 Sustainable fisheries as a proportion of GDP in small island developing States, least developed countries and all countries **Overview**: indicator essentially tracks an estimated percentage of GDP from marine fisheries multiplied by a sustainability score based on the amount of the catch from different FAO regions and whether those are within MSY. **Methodology**: see metadata	SDG 14.7.1	This indicator is unlikely to be suitable both because the use of overall GDP as a denominator will make data difficult to interpret and because considering revenue from sustainable fisheries without that from considering unsustainable fisheries will prevent clear evaluation and may encourage maladaptive policies.

B. Indicators from other sources assessed

Food systems-related Indicators from other sources with potential suitability		
Indicator and background information	**Framework**	**Comments**
Indicators with good suitability		
Availability of fruits and vegetables in a country's food supply per capita per day **Overview:** Indicator uses FAOSTAT data to measure the quantity of fruits and vegetables available in a country's food supply at the national level. **Methodology:** See metadata	Food Systems Countdown Initiative (FSCI 1.1.b)	Suitable complementary indicator for equitable access to adequate food and nutrition

Per-person cost of a healthy diet **Overview:** Indicator uses FAOSTAT data to estimate the per-person cost of the least expensive locally available foods to meet daily needs, based on food-based dietary guidelines. **Methodology:** See metadata	Food Systems Countdown Initiative (FSCI 1.1.a)	Suitable complementary indicator for equitable access to adequate food and nutrition. Not relevant to climate-resilient food and agricultural production and supply and distribution of food, nor to increasing sustainable and regenerative production, as most FBDGs do not currently factor in environmental considerations in their design.
Percent population who cannot afford a healthy diet **Overview:** The share of the population whose food budget is below the cost of a healthy diet **Methodology:** See metadata	Food Systems Countdown Initiative (FSCI 1.2.c)	Suitable complementary indicator for equitable access to adequate food and nutrition. Not relevant to climate-resilient food and agricultural production and supply and distribution of food, nor to increasing sustainable and regenerative production, as this indicator defines a healthy diet based on food-based dietary guidelines (FBDGs), and most FBDGs do not currently factor in environmental considerations in their design.
Dietary sourcing flexibility index **Overview:** Indicator measures the diversity of pathways through which food reaches consumers, inclusive of domestic production, stocks and imports. **Methodology:** See Annex I	Food Systems Countdown Initiative (FSCI 5.1.b), based on data and methodology developed by FAO (soon to be available in FAOSTAT)	Suitable complementary indicator for climate-resilient food and agricultural production and supply and distribution of food. It should be noted, this indicator only measures how vulnerable specific parts of the food system is to disruption, and does not provide insight on how easily the component would recover from the disruption. Developed by FAO for the State of Food and Agriculture 2021 report, the index is one of the indicators tracked by the Food System Countdown Initiative.
Some suitability (limitations in either relevance or data)		
Countries with a National Food Systems Transformation Pathway **Overview:** Indicator measures whether a country has developed a food system transformation pathway through the UNFSS process **Methodology:** Presence of a NFSTP as reported to the FAO UNFSS Hub	Food Systems Countdown Initiative (FSCI 4.1.d)	Potentially suitable complementary indicator of governance addressing equitable access to adequate food and nutrition, climate-resilient food and agricultural production and supply and distribution of food, and increasing sustainable and regenerative production, particularly if National Food Systems Transformation Pathways address Action Tracks 1,2,3 and 5.
Primary production flexibility index **Overview:** Indicator measures extent of diversity in production across crop and livestock commodities and the potential to produce for domestic and export markets. **Methodology:** See Annex I	FAO	Potentially suitable complementary indicator for climate-resilient food and agricultural production and supply. It should be noted, this indicator only measures how vulnerable a country's production and markets are to a production shock to a specific commodity or a demand shock, with no insight as to the length/ease of recovering from such disruptions. Developed by FAO for the State of Food and Agriculture 2021 report, and not currently tracked elsewhere.

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Endorsing organizations (sign-ons received by July 31, 2024, below; see additionally a complete list here)

Africa Centre for Sustainable and Inclusive Development
Aquatic Life Institute
Brighter Green
CGIAR Research Initiative on Livestock and Climate
Global Alliance for Improved Nutrition (GAIN)
Global Crop Diversity Trust (Crop Trust)
Global Youth Coalition
Humane Society International
International Association of Students in Agricultural and Related Sciences (IAAS)
International Livestock Research Institute
Mercy For Animals
Plant Based Treaty
ProVeg International
Real Food Systems Youth Network