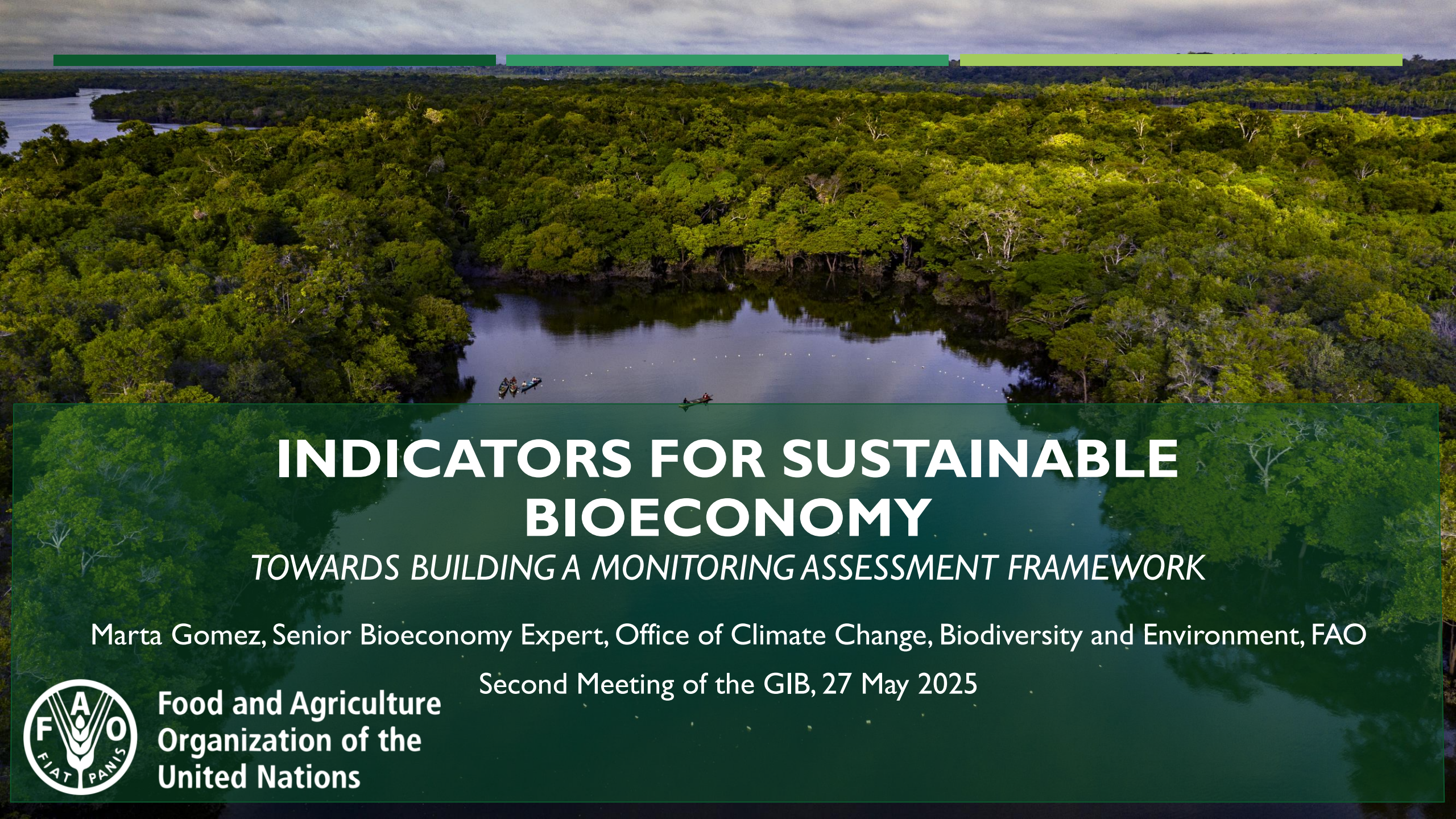


INDICATORS FOR SUSTAINABLE BIOECONOMY

TOWARDS BUILDING A MONITORING ASSESSMENT FRAMEWORK

Marta Gomez, Senior Bioeconomy Expert, Office of Climate Change, Biodiversity and Environment, FAO

Second Meeting of the GIB, 27 May 2025

Food and Agriculture Organization of the United Nations

BACKGROUND

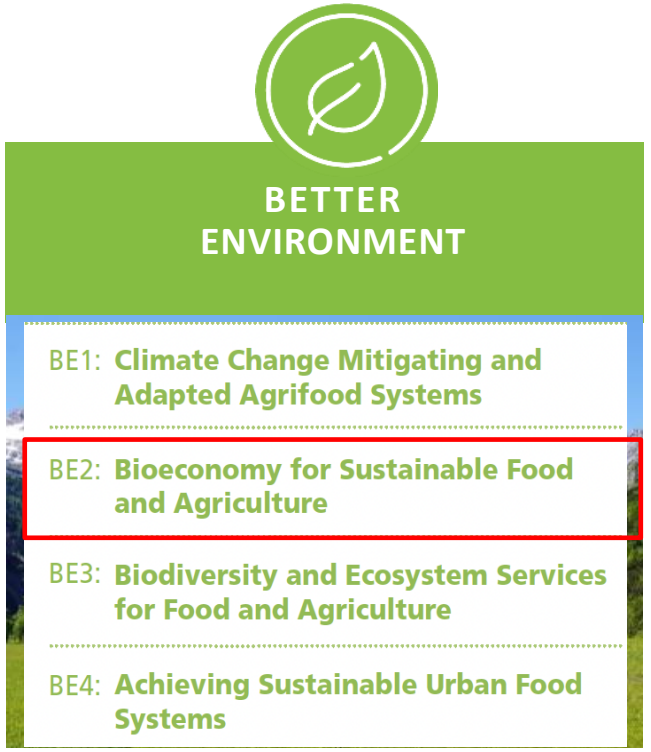
A collaborative work between **FAO and CIFOR-ICRAF, and with inputs from FTAP and FAO PPA Network,** reviews existing sustainability indicators and frameworks for bioeconomy. The work aims to contribute to FAO's knowledge products on sustainability of agrifood systems, while supporting global efforts to establish universally accepted principles for sustainable bioeconomy.

The aim is to propose **an operational framework for public and private private actors to build their monitoring and assessment of the bioeconomy and its sustainability**.

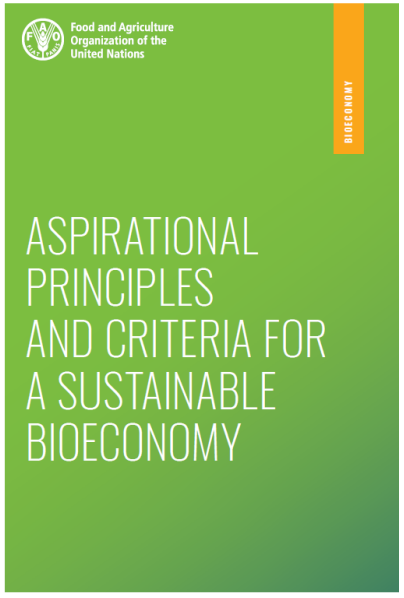
Developed thanks to the support of FAO 10-year Programme Priority Priority Area (PPA) BE2:

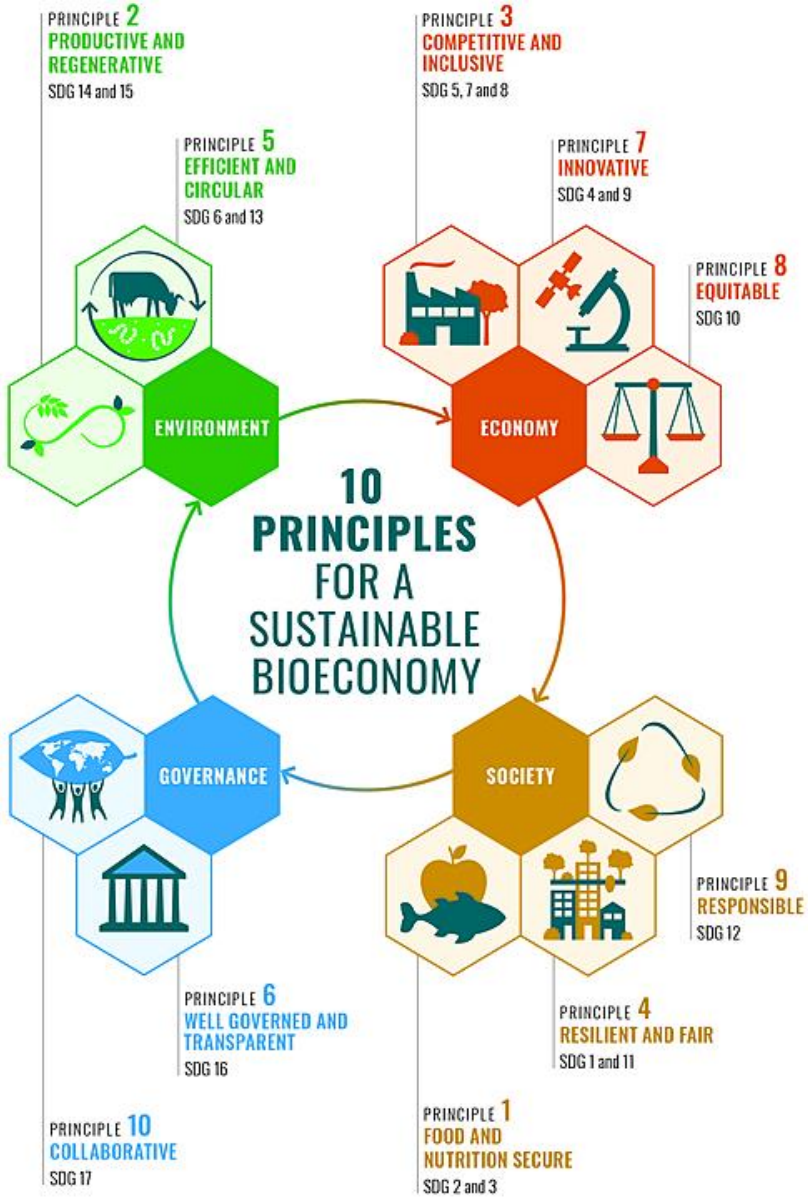
PILAR IV: KNOWLEDGE CREATION

- Facilitate information sharing and standard setting



FAO's WORK ON METRICS – FOCUS ON **SUSTAINABILITY**





BIOECONOMY INDICATORS WORK IN FAO SINCE 2016

2016

After the **GFFA 2015**, FAO established the **International Sustainable Bioeconomy Working Group (ISBWG)**

FAO and ISBWG Developed the **10 Aspirational Principles and 24 Criteria** for a sustainable bioeconomy

FAO published its first **sustainability** strategies **analysis** and imple mentation

2018

Workshop on indicators in Berlin, Germany (during the **Global Bioeconomy Summit** 2018)

2 main lessons:

- **Four main applications** and their combination: Ex ante / Ex post / Territorial / Value chain
- **Reduced list** of core indicators covering all aspects of P&C (economy, society, environment and governance) and analysing tradeoffs

2019

Based on the workshop, FAO published the first **compilation of indicators** finding that, despite the wide range of available criteria, there is a lack of bioeconomy- and context- specific metrics **impact and performance**

Other publications:

-GDP Contribution
-Good practice proxies
-SDGs interrelations
-Certification, standards, labels

2021

Commissioned by the International Bioeconomy Forum, and together with the EC, FAO published 10 steps for building a monitoring framework in 197 Members at the **42nd FAO Conference** elevated BE as a corporate **Programme Priority Area** (22-31), focusing on SDG12, MEAs and normative work

2023

43rd FAO Conference stressed the importance to discuss BE **within FAO governing bodies and technical committees** (with dedicated papers)

FAO and Thunen institute published a case study in Uruguay on **material flow and sectoral analyses of 5 value chains**

And FAO launched 2 papers at the COPs

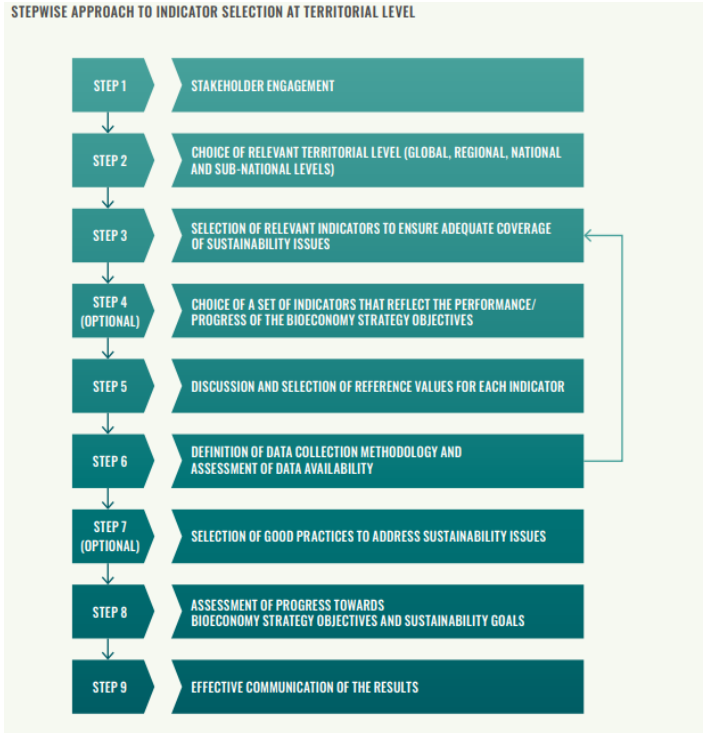
2024

FAO published a Bioeconomy **toolbox and a dashboard** to support the design, implementation and monitoring of strategies and policies

During the **G20 Initiative on Bioeconomy GIB**, FAO published a paper including a review of strategies and links to the agreed HLPs

MILESTONE IN 2019: INDICATORS COMPILATION

In 2019 FAO undertook a detailed review of available indicators to assess the sustainability of the bioeconomy at **territorial** and **product/value chain level**, mapping these to the *Principles and Criteria for a Sustainable and Circular Bioeconomy* and defining a stepwise approach to appropriate indicator selection.



INDICATORS FOR MONITORING SUSTAINABILITY AT TERRITORIAL LEVEL

Colour code: Economic Social Environmental

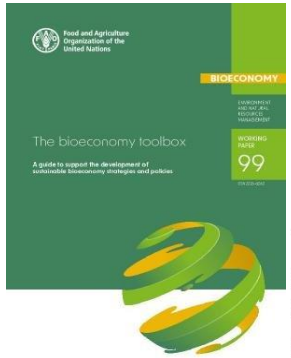
	CRITERION	IMPACT CATEGORY	INDICATOR (UNIT) [SOURCE]
A SUSTAINABLE BIOECONOMY DEVELOPMENT SHOULD SUPPORT FOOD SECURITY AND NUTRITION AT ALL LEVELS	1.1. FOOD SECURITY AND NUTRITION ARE SUPPORTED	1.1.a Food security	Domestic food production (S) [13]
			Domestic food stock (S) [13]
			Price and supply of a national food basket (Tonnes: S: and percentage) [7]
			Change in food price volatility [10: 15]
			Change in food prices [10: 15]
			Change in demand for foodstuffs for food, feed, and fibre [7]
			Changes in the import and export of foodstuffs (S) [13]
			SDG 2.1.2 Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES) [5]
			SDG 2.c.1 Indicator of food price anomalies [5]
		1.1.b Nutrition	Nutrition (threshold of 2 700 kcal per capita) [12]
			Changes in macro-nutrient intake/availability [10: 15]
			Change in malnutrition or risk of hunger [10: 15]
			SDG 2.1.1 Prevalence of undernourishment [5]
	1.2. SUSTAINABLE INTENSIFICATION OF BIOMASS PRODUCTION IS PROMOTED	1.2.a Domestic biomass production	Domestic production of agricultural, blue, forestry and waste biomass (kg/capita) [2: 10]
		1.2.b Yield / agricultural productivity	Productivity of feedstock or by farm/plantation (tonnes ha per year) [7]
			Change in land use intensity (inputs / outputs / system based: e.g. felling ratio, crop yields and animal stocking density) [10: 15]
			SDG 2.4.1 Proportion of agricultural area under productive and sustainable agriculture [5]
			SDG 2.3.1 Volume of production per labour unit by classes of farming/pastoral/forestry enterprise size [5]
		1.2.c Land for biomass production	Embodied human appropriation of net primary production (eHANPP) (t/capita/yr) [12]
			Total area of land for bioeconomy feedstock production, and as compared to total national surface [7]
			Land cover (share of total area, %): forest area and agricultural area (incl. cropland and grassland) [13]
			Land use (forestry: agricultural and horticultural land as % of total land area) [2: 18]
			Ecological Footprint (global hectares/capita/year) [12: 18]

OBJECTIVE	INDICATOR NUMBER	INDICATOR
Eco-Intensification	Indicator 1.2.2	Productivity of feedstock or by farm/plantation (tonnes ha per year)
	Indicator 1.2.3	Change in land use intensity (inputs / outputs / system based: e.g. felling ratio, crop yields and animal stocking density)
Value-chain efficiency	Indicator 3.1.16	Cluster size (number of businesses or employees in each cluster (% of total firms)
	Indicator 6.1.2	Cluster governance (the support provided by local/regional/national government in setting up and managing the cluster, as well as any cluster-friendly policies that are introduced)
Promotion of Ecosystem Services	Indicator 2.4.3	SDG 15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type
	Indicator 9.2.9	Public financial support and private investments for ecosystem services (S)
Enhancing competition	Indicator 3.2.8	Labour productivity (S)
	Indicator 10.1.5	Density of firms in the (sub)sectors
Job creation	Indicator 3.2.6	Job creation in skilled / unskilled labour
Climate action	Indicator 2.2.1	SDG 9.4.1 CO_2 emission per unit of value added
	Indicator 2.2.9	Public financial support and private investments for mitigation and adaptation (S)
	Indicator 7.2.3	SDG 4.7.1/12.8.1 Extent to which (i) global citizenship education and (ii) education for sustainable development (including climate change education) are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment

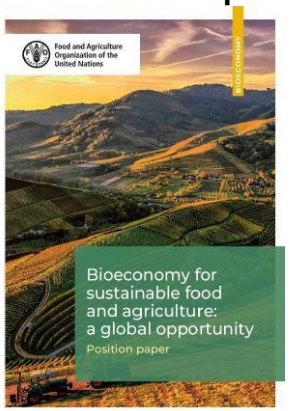
Source: Authors

BUILDING ON NATIONAL AND GLOBAL COMMITMENTS

- 2024 Toolbox: How data is used in different stages of bioeconomy development



- 2024 Position paper: How monitoring framework respond to policy strategies



Appendix 4

Examples of bioeconomy strategies and action plans with monitoring frameworks and examples of monitoring methods and indicators

Austria: A scientific monitoring group was formed to assure the quality of the strategy development process and carry out studies on sustainability and other issues. There are also flagship projects used as proxies for the advancement of the strategy. (Austria, 2019).

Brazil: The strategy mandates the creation of indicators within the National Bioeconomy Development Plan. Also, the Ministry of Environment and Climate Change is in charge of a National System of Information and Knowledge on the Bioeconomy, for collecting, processing and storing information on the performance of the bioeconomy. (Brazil, 2024). The sub-national bioeconomy strategy of Para State links its result-based indicators to the objectives and actions as well as to the monitoring of the State Policy on Climate Change, among others. (State of Para, 2022).

Costa Rica: A bioeconomy observatory has been set up. Monitoring efforts are based on international criteria to demonstrate the alignment of the national strategy with multilateral agreements and international initiatives. (Costa Rica, 2020).

Finland: The revised strategy focuses on measuring value addition through circularity. It has also adopted the European Union bioeconomy strategy sustainability indicators. The Ministry of Economic Affairs and Employment is responsible for implementing the monitoring system. Finland monitors the main sectors (food, wood products, pulp and paper, bioenergy, bio-construction

MAY 2025: BUILDING ON RECENT GLOBAL MOMENTUM

Explicit text or work on bioeconomy metrics, indicators, standards, etc. in :

FAO Committee on Forestry (July 2024) and in the 29 Committee on Agriculture (September 2024). Workshop in November 24

GBS communiqué (October 2024)

G7-OECD event (October 2024)

GFFA communiqué (January 2025) (and 2021)

G20 Initiative on bioeconomy issue note (May 2025)

Document shared with GIB by email

Just the begining

Structuring indicators selection

The Sustainable Development Goals (2015)

17 Goals, 169 targets and 232 indicators for sustainable development

FAO-ISBWG Aspirational Principles and Criteria (2016)

10 aspirational principles and 24 criteria providing the first global reference framework

G20 High-Level Principles (2024)

10 multilaterally agreed, non-binding principles addressing all sustainable development dimensions

A clear conceptual framework is essential for structuring a shared vision and enabling comprehensive assessment of bioeconomy's sustainability.

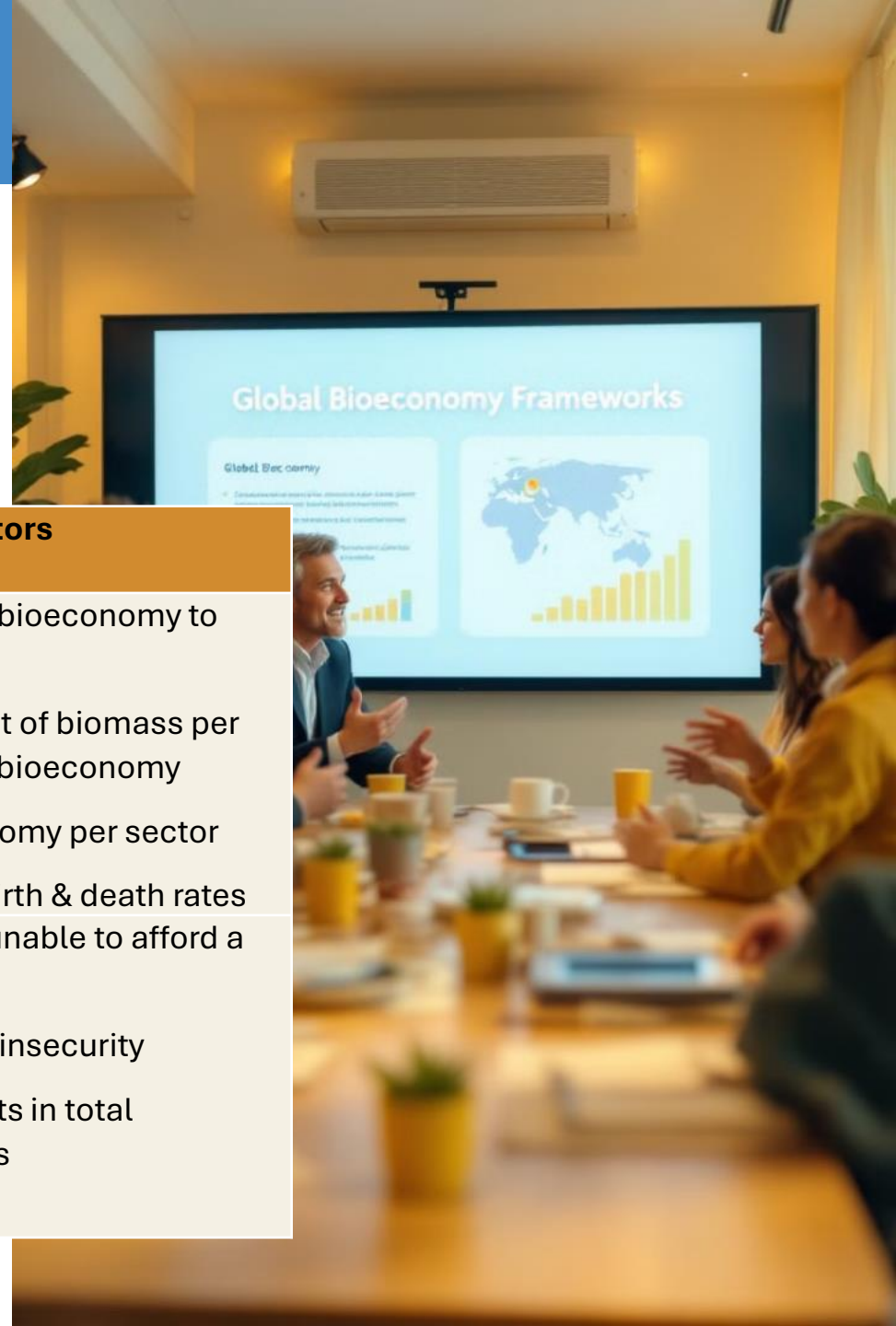
At the global level, internationally recognized frameworks such as the G20 High-Level Principles can guide the development of such a framework.

The aim is to improve strategy design, policy coherence, and cross-country knowledge exchange, while reducing duplicated reporting efforts.

Structuring indicators selection

Suggested correlation between the SDGs and the proposed HLPs, and further links to the FAO-ISBWG Aspirational Principles and Criteria, and examples of indicators that can be found in the database.

GIB High-Level Principles (HLPs)	FAO criteria addressed	Examples of some SDG targets addressed	Examples of indicators
1. Integrate and promote **sustainable development** across its economic, social and environmental dimensions, contribute to eradicating **hunger and poverty** and improving health and well-being, whilst ensuring global **food security and nutrition**. (…)	3.1 Economic development is fostered	1.2 By 2030, reduce (…) poverty… 1.a Ensure significant mobilization of resources… 17.15 Respect each country's policy space…	-Contribution of the bioeconomy to GDP -Value added per unit of biomass per person employed in bioeconomy -Turnover in bioeconomy per sector -Bioeconomy SME birth & death rates
	1.1 Food security and nutrition are supported (…)	2.1 By 2030, end hunger and ensure access by all people… (…)	-Number of people unable to afford a healthy diet - Prevalence of food insecurity -Value of food imports in total merchandise exports (…)



The ESIB Database: A Tool for Indicator Selection

5,300

Total Entries

From 32 screened references,

close to 50 frameworks

3,997

Relevant Entries

For monitoring bioeconomy sustainability.

More in the territorial level

Simplified model for the application of metrics: aligning indicators selection indicators to sustainability frameworks while ensuring flexibility

Excel-based Database on Sustainability Indicators for the Bioeconomy (ESIB database) aims to collect information on existing indicators and consolidate them around Principles, to monitor performance and assess sustainability (tradeoffs).

The database is designed to be updated easily. Each entry links an indicator to a reference, detailing its relevance, status, and the sustainability challenge it addresses.

SCREENING AND OPERATIONAL CLASSIFICATION

The database helps connect UN SDGs, the ISBWG framework, and G20 High-Level Principles, showing how the bioeconomy contributes to the 2030 Agenda. This can help create a monitoring system focused on key goals while accounting for trade-offs among sustainability issues.

Users can navigate step-by-step:

1. Levels
2. International sustainability frameworks
3. Strategic objectives (explicitly mentioned)
4. Action areas (keywords)
5. Tiers and publicly available datasets

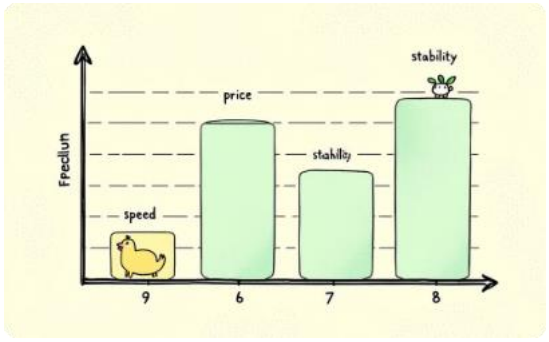
CLASSIFICATION OF EACH INDICATOR
Relevance to monitor and assess sustainable bioeconomy: Relevant (R) vs. Irrelevant (I)
Main level: Territorial (T); Product/Value chain (P); Business/Sector (B)
Main G20 High Level Principle addressed
Main SDG addressed
Where appropriate, **main SDG target addressed**
Main FAO-ISBWG Principle addressed
Main FAO-ISBWG Criteria addressed
Main strategic objective addressed (social, economic, environmental pillars; and governance as a cross-cutting objective)
Main area of **action** addressed (using the five actions verbs structuring the operational framework proposed in the publication)
Development status of the indicator: Tier I, Tier II, Tier III as defined in the source
Open-source datasets, where available

Selecting Bioeconomy Indicators: The "How" Step

Selecting the **short-list** of indicators to be included in the assessment framework.

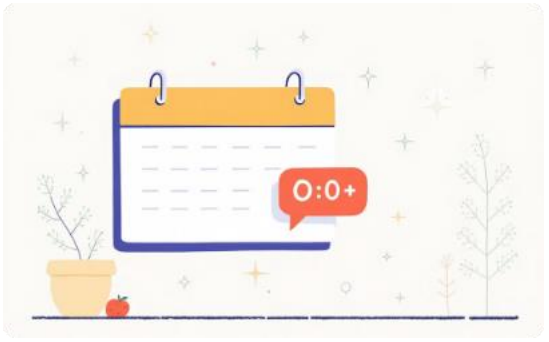
Specific

Focus on a clearly defined area. Instead Instead of broadly measuring "sustainability," concentrate on the carbon footprint of biofuel production production in a particular region.



Measurable

Use indicators that are quantifiable and quantifiable and verifiable. For example, measure the percentage increase in consumer adoption of bio-bio-based products.



Time-bound

Establish a clear deadline for achieving achieving targets. Aim to reduce waste waste by 15% in the next year.

Achievable

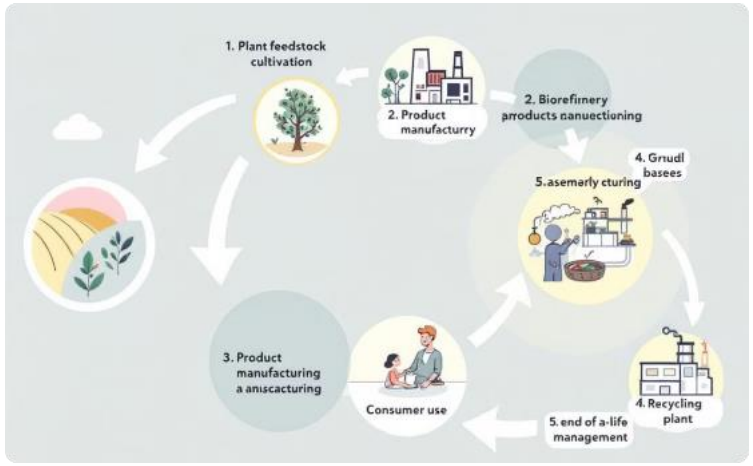
Ensure the targets are realistic and attainable. A target that demands technology which is not yet developed developed would not be achievable. achievable.

Effective indicators are **simple, based on proven methodologies, relevant to the goals, focused on results, available on time, comparable, and clearly defined.** Selection should be a collaborative effort.

The ‘What’: Indicators are classified in three levels

Territorial Approaches

Visualize local, regional, and national indicators with GIS and remote sensing, promoting coordinated cross-sector strategies.



Product and Value Chain Approaches

Implement life cycle assessments for bio-based products, enhancing traceability and establishing credible certification standards.

Updtaed

Sectors and Businesses

Integrate sustainability into ESG reporting and form form sector-specific groups to tailor the framework for framework for business.

New

Effective implementation requires context-specific customization aligned with global sustainability frameworks.

A systematic approach helps stakeholders develop bioeconomy monitoring systems that track progress, inform policy, and support adaptive governance.

Action Verbs for Structuring Bioeconomy Vision

Optimize/Save

Resource efficiency and waste reduction

Produce/Add Value

Economic dimension focusing on production and value addition

Conserve/Preserve

Environmental protection and biodiversity conservation

Innovate/Integrate

Governance and innovation for sustainable development

Secure/Protect

Social dimension ensuring basic needs and rights

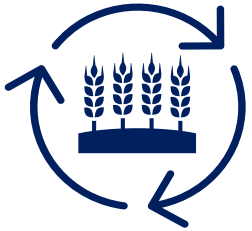
The document suggests **five action verb pairs that can help structure a shared vision of bioeconomy** and develop a simple yet comprehensive assessment system. These verbs enable the selection of significant indicators without overlooking important dimensions.

Generic action verbs allowing each stakeholder group to formulate precise objectives adapted to their circumstances and priorities. The first three keywords reflect traditional sustainability components, while the last two support a do-no-harm perspective to address basic needs and ensure good governance.

CONCLUSIONS: CHALLENGES TO OVERCOME IN BIOECONOMY MONITORING AND ASSESSMENT

- Diversity of bioeconomy strategies
- variability in definitions and objectives
- challenges of standardized approaches
- reflection of national priorities and necessity for tailored indicators
- data scarcity issues and variability in data reporting
- challenges of biomass data collection e.g. underreported biomass
- challenges in sectorial classification in national statistics
- capacity disparities among regions
- technical expertise gaps in developing countries
- synergies and trade-offs
- importance of comprehensive monitoring for supporting informed decision-making is not well understood
- there are call for collaborative efforts but lack of multilateral platforms for engaging stakeholders

RECOMMENDATIONS: GLOBAL EFFORTS ARE NEEDED FOR FURTHER ESTABLISHING BIOECONOMY METRICS



Bioeconomy strategies incorporate sustainability objectives that should be monitored across multiple levels, including territorial, sectoral, value chain/product, financial, and business dimensions

Environmental, social, economic, and good governance principles and criteria should be equally represented in monitoring frameworks

A simple and operational set of indicators, supported by accessible and reliable data, could serve as a useful framework to enhance coherence in monitoring the sustainability of bioeconomies

International cooperation in designing this framework is necessary to enhance the normative quality of the results

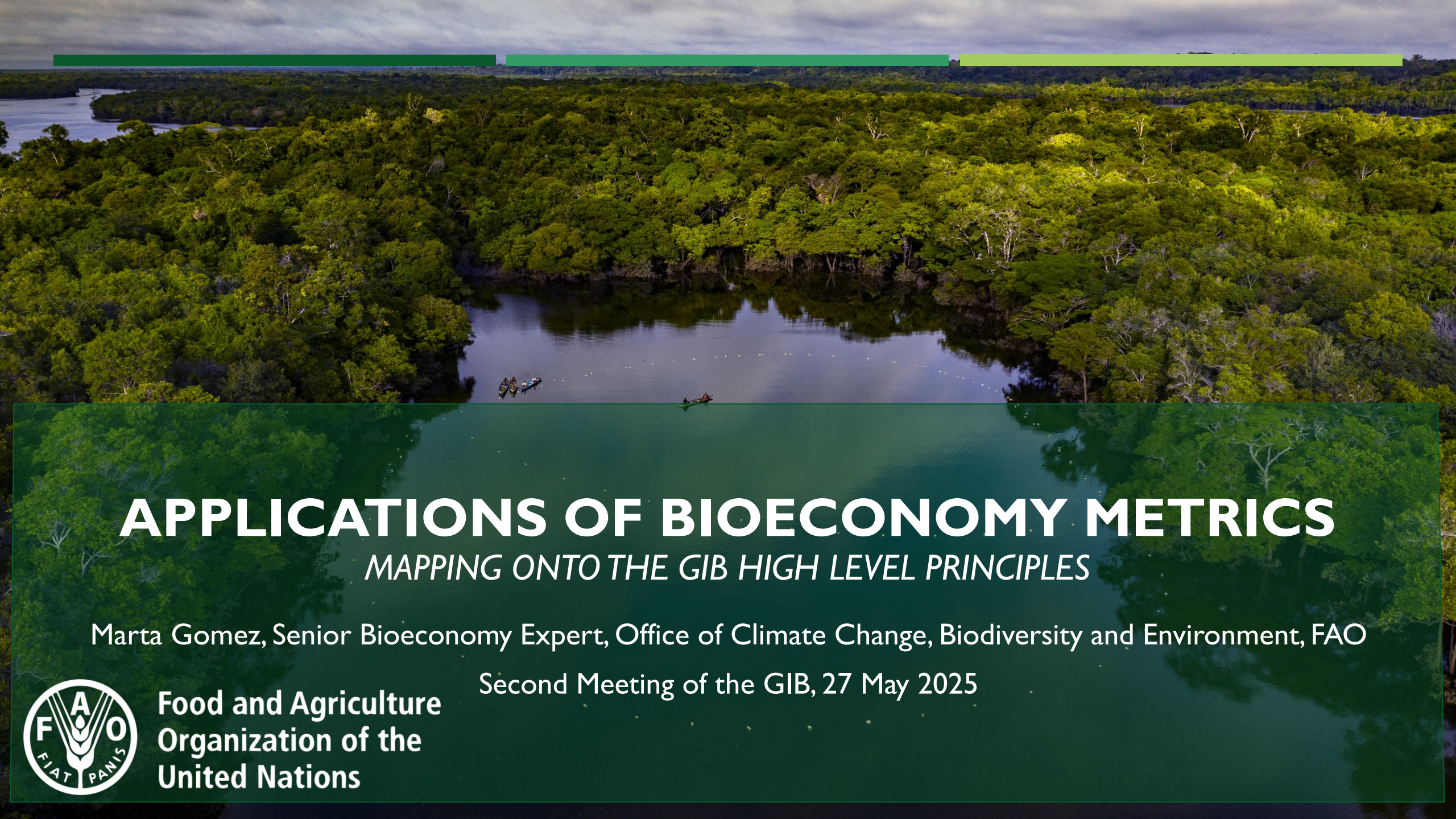
THANK YOU

ADDITIONAL INFORMATION

Bioeconomy@fao.org

www.fao.org/in-action/sustainable-and-circular-bioeconomy/en

Food and Agriculture Organization of the United Nations



APPLICATIONS OF BIOECONOMY METRICS

MAPPING ONTO THE GIB HIGH LEVEL PRINCIPLES

Marta Gomez, Senior Bioeconomy Expert, Office of Climate Change, Biodiversity and Environment, FAO

Second Meeting of the GIB, 27 May 2025

Food and Agriculture Organization of the United Nations

APPLICATIONS OF FAO'S PRINCIPLES AND CRITERIA

Global policy

National policy

Territories

Product/ value chain (including trade)

Business and investment

FAO supports the design of analytical frameworks and sustainability indicators to help decision-making processes

GLOBAL LEVEL: MONITORING WITH THE BIOECONOMY DASHBOARD

ood and Agriculture
rganization of the
nited Nations

Global overview on bioeconomy around the world

Download

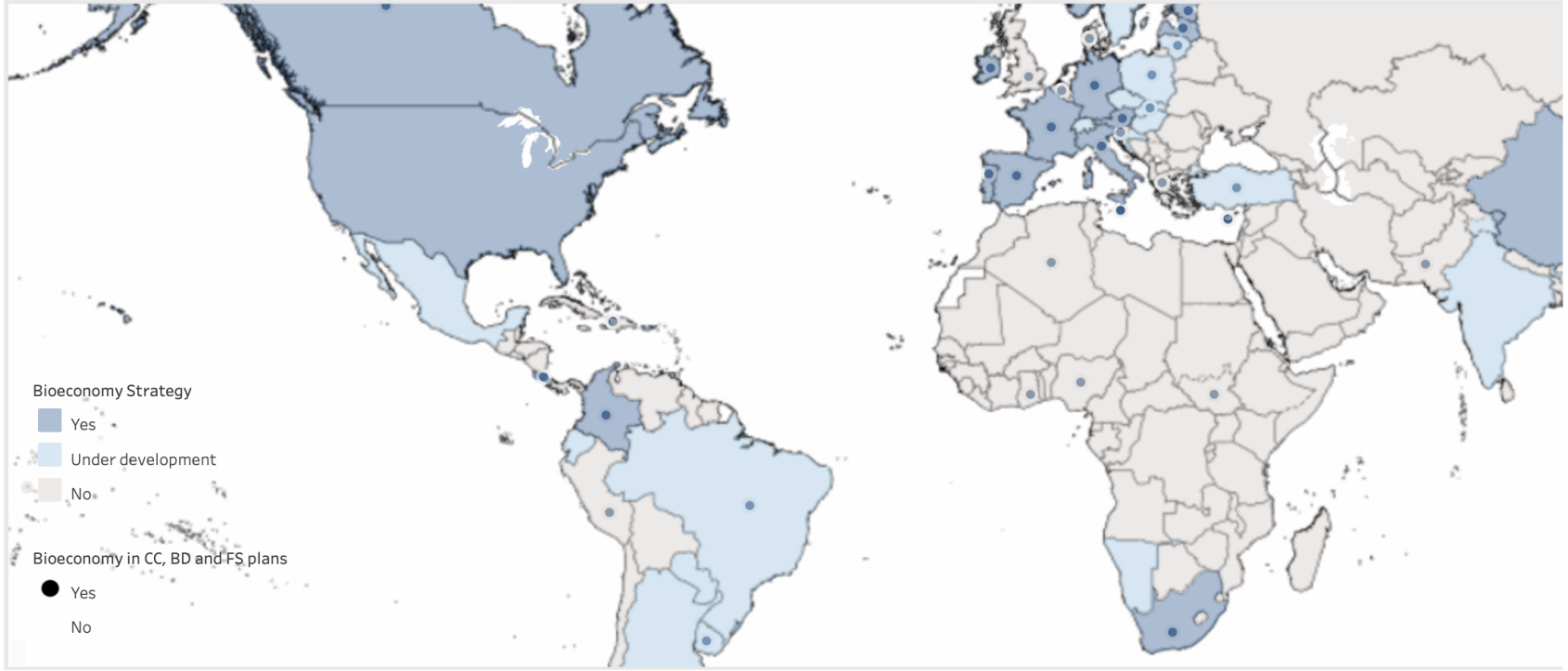
How to

National bioeconomy strategies: (All)

Multi-country bioeconomy strategies: (All)

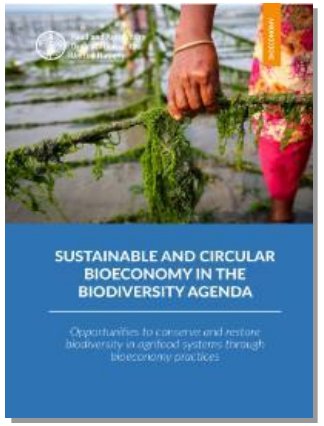
Bioeconomy mentioned in key national climate, biodiversity and food systems plans: (All)

Hover over the countries on this map to see more information



EXAMPLE Biodiversity :

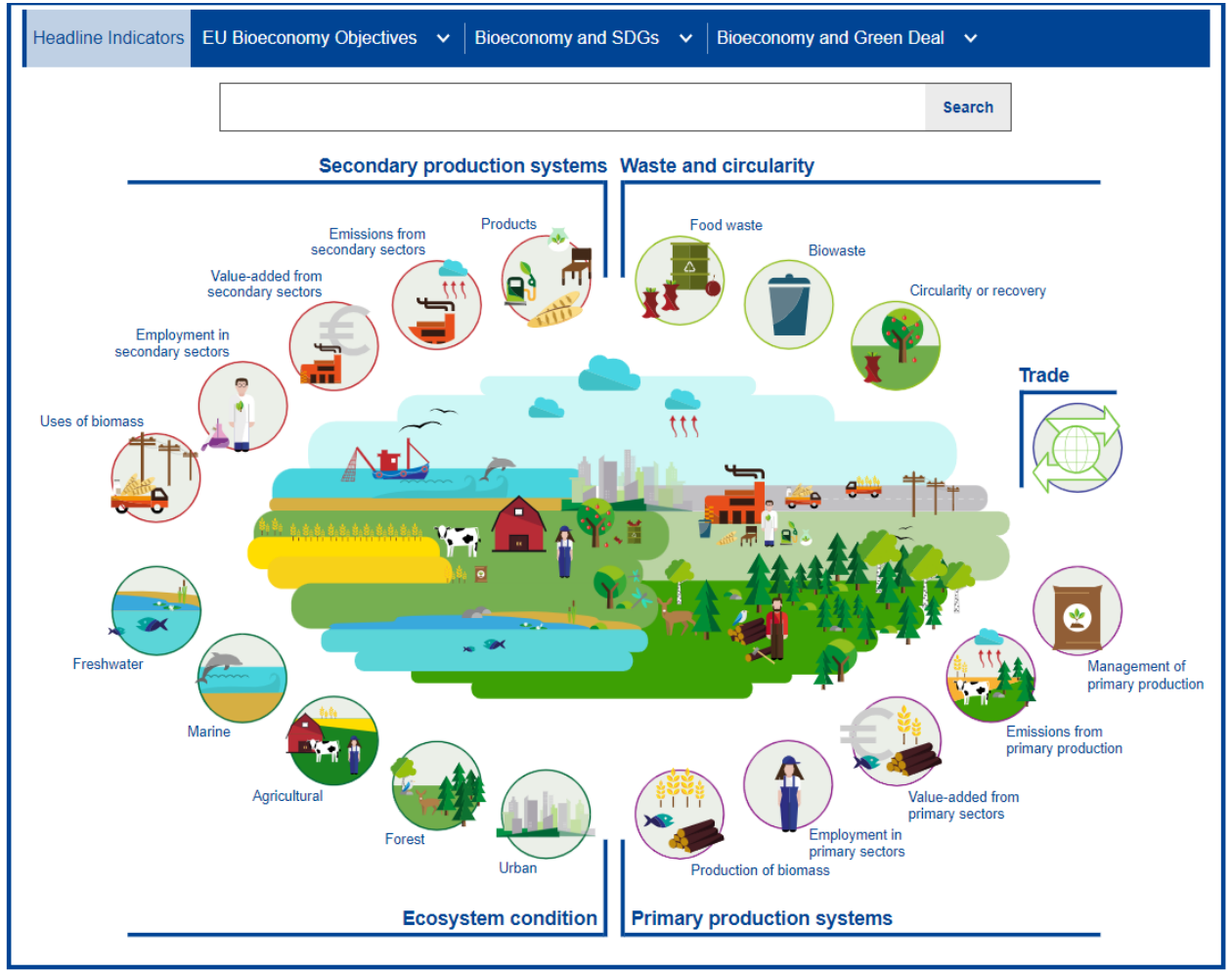
Bioeconomy is mentioned in 17 NBSAPs or National Biodiversity Reports



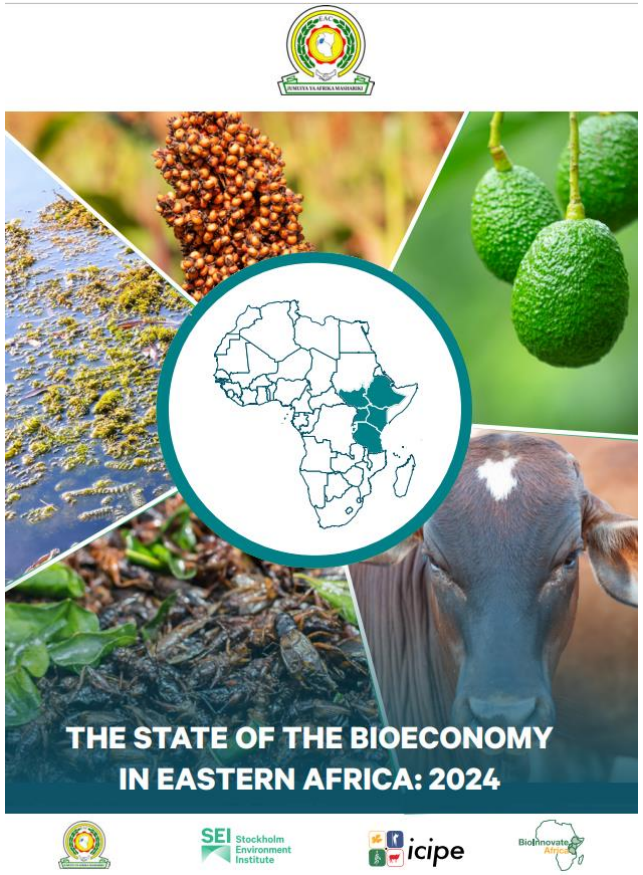
Algeria
Denmark
Finland
Indonesia
Netherlands
Pakistan
South Africa
Thailand
Brazil
Canada
Finland
Haiti
Indonesia
Netherlands
Peru
Portugal
Sweden

REGIONAL LEVEL: EXAMPLES OF THE APPPLICATION OF P&C

EU bioeconomy strategy monitoring system



Focus on food security and sustainable agriculture, first status report encompassed all the focus areas in the Regional Strategy



NATIONAL LEVEL: EXAMPLES OF THE APPPLICATION OF P&C

FAO BIOECONOMY TOOLBOX TO SUPPORT THE DESIGN, IMPLEMENTATION AND MONITORING OF BIOECONOMY STRATEGIES

Namibia bioeconomy strategy monitoring system

BIOECONOMY STRATEGY MONITORING AND EVALUATION FRAMEWORK

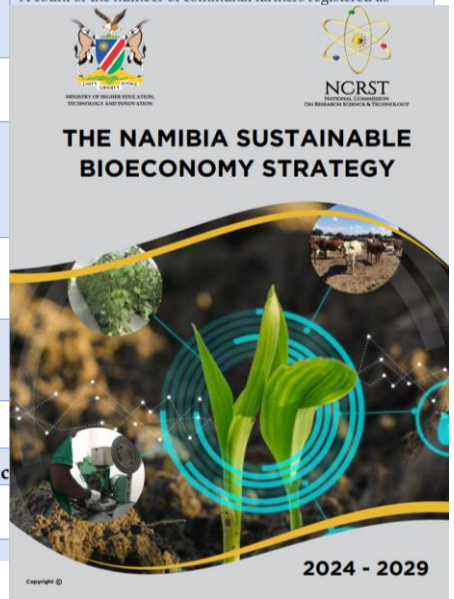
OBJECTIVE 1: TO CREATE VALUE-ADDITION PLATFORMS FOR BIO-BASED PRODUCTS

STRATEGY 1: Promote and support the quality of bio-based indigenous products and services

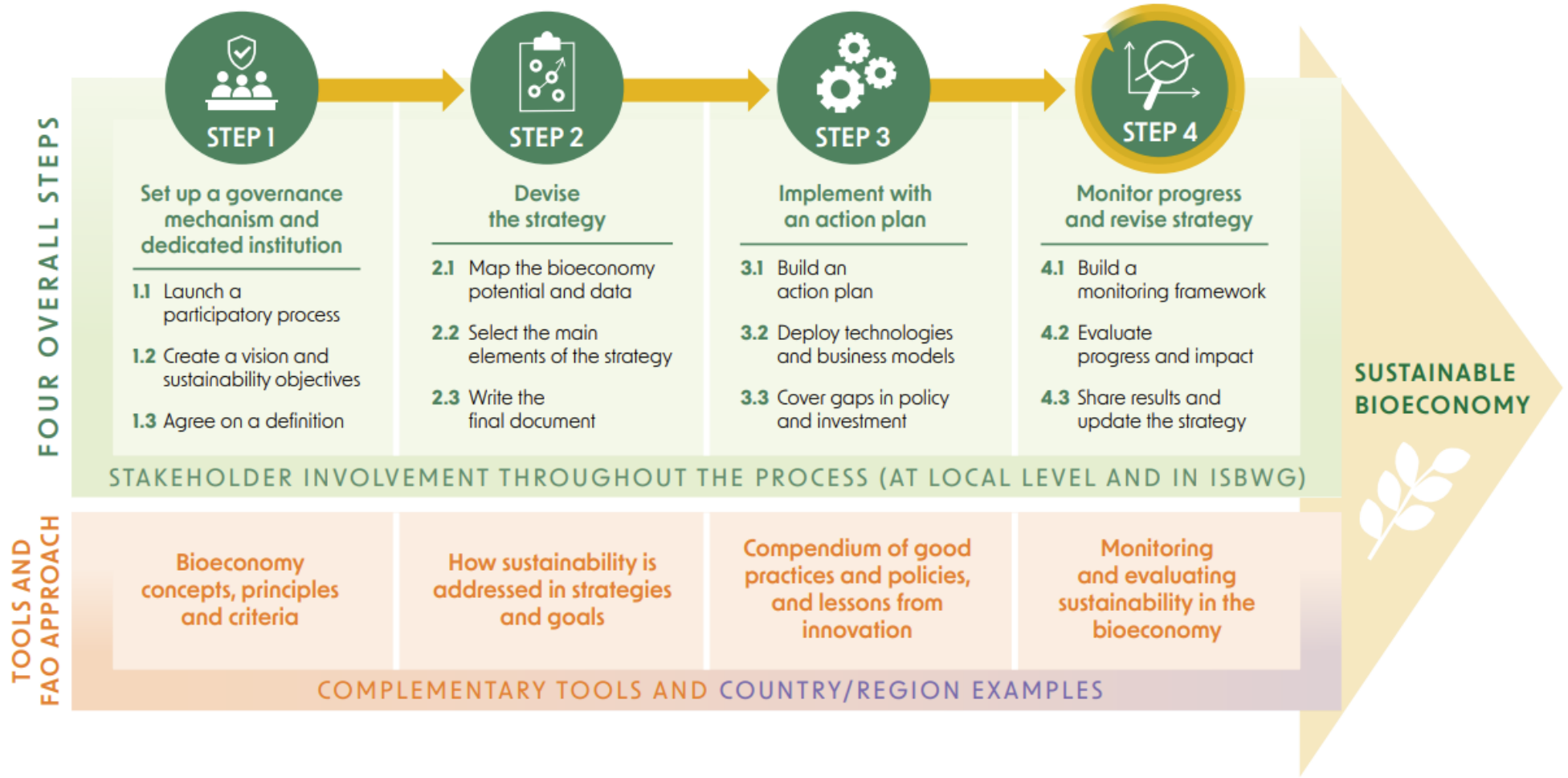
Indicators	Data Collection / Source	Frequency	Year/ Month	Base-Line	Target	Purpose, Calculation
Amount of funds mobilised.	NCRST, MAWLR	Annually	2024	0	N$ 5 000 000	The total amount of funds mobilised for value-addition initiatives
Number of biomass projects in communal areas	MEFT, NCRST, EIF	Annually	2024	0	3	Count of biomass projects within communal areas participating in the overall biomass value-chain
Number of communal farmers that are members of the communal biomass associations.	NCRST, MAWLR, MEFT, EIF, NGOs, N-BiG	Annually	2024	0	15	A count of the number of communal farmers registered as
Number of biomass products produced by communities	NCRST, MAWLR, MEFT, EIF, NGOs, N-BiG	Annually	2024	0	3	
Number of new infrastructures constructed with modern technologies utilised for sustainable production purposes	NCRST, MAWLR, MURD, MEFT, EIF, MHETI, Universities	Annually	2024	0	2	
Number of existing infrastructures equipped with modern technologies	NCRST, MAWLR, MURD, MEFT, EIF, MHETI, Universities	Annually	2024	0	2	
Number of SMEs supported at the established technology	Attendance registers of tech stations, AMTA, MAWLR	Annually	2024	-	5	
er of users ng platforms	AMTA, MAWLR	Annually	2024	-	10	

ATEGY 2: Enhance products produced through bio-innovation from indigenous biologic

ators	Data Collection / Source	Frequency	Year/ Month	Base-line	Target
	NCRST, MIT, MAWLR, MURD, MEFT	Annually	2024	0	4



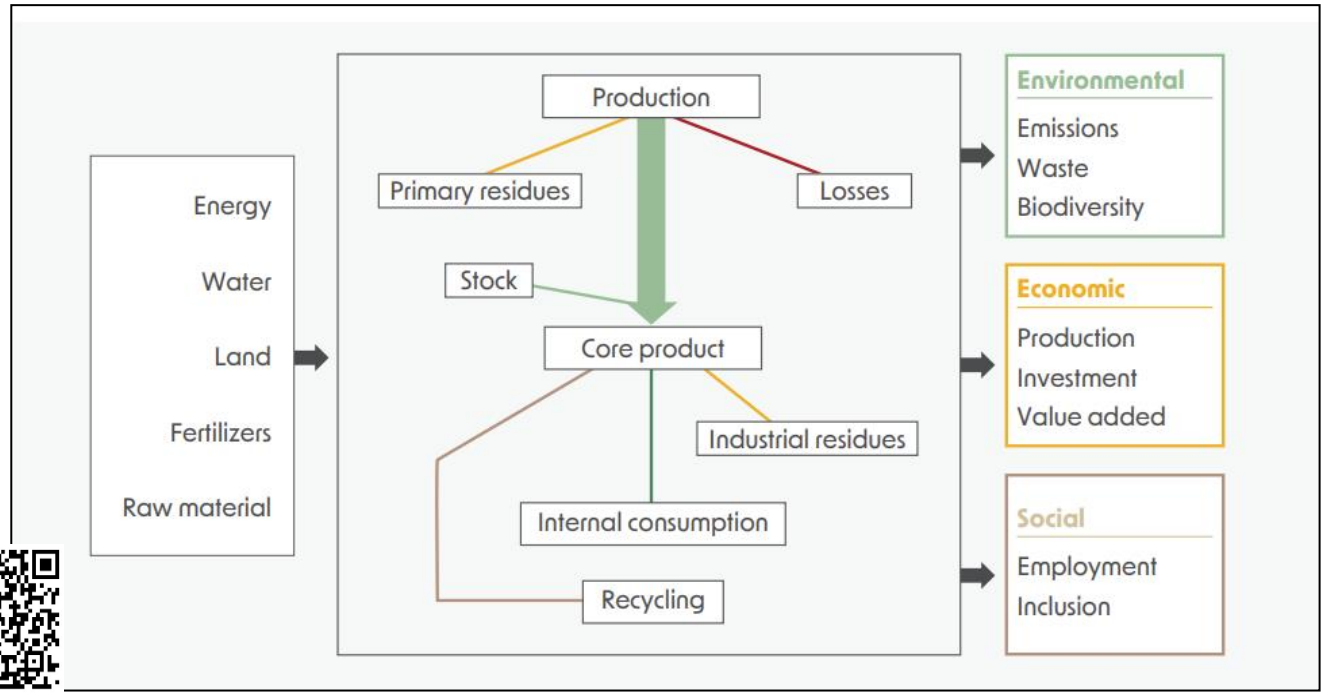
BIOECONOMY STRATEGY DEVELOPMENT AND IMPLEMENTATION TOOLBOX



PRODUCT LEVEL:
VALUE CHAIN INDICATORS AND MATERIAL FLOW ANALYSIS

With a multistakeholder process, countries select the value chains, criteria and methodology/ indicators.

Uruguay: Material flows and bio-based shares analysed in the value chains of soybean, beef, dairy, pulp, and fisheries



3 circularity principles

- Eliminate waste and pollution, driven by design and SCP
- Circulate products and materials (at their highest value)
- Regenerate nature

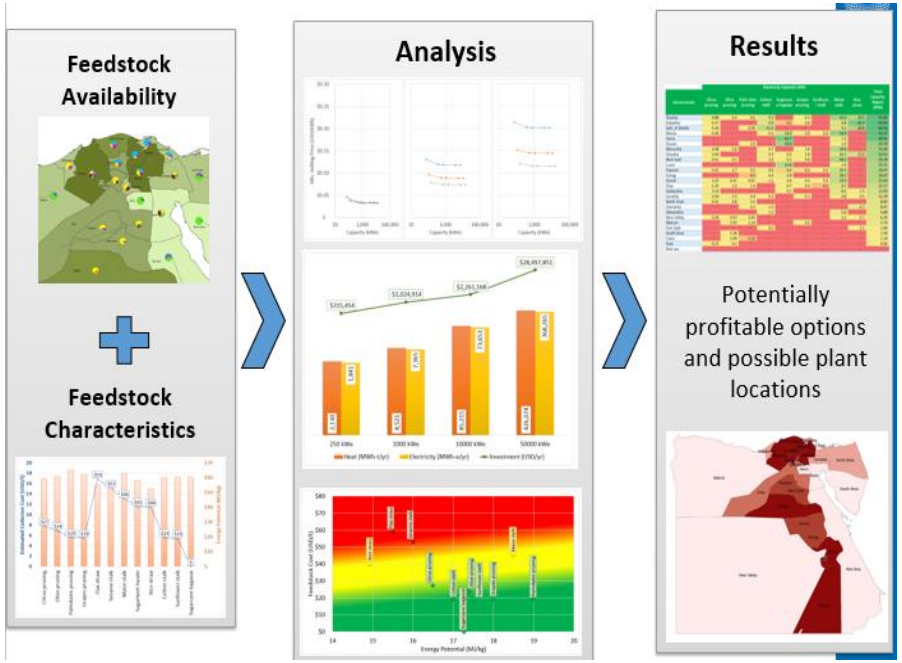
TRADE-RELATED INDICATORS FOUND IN SOURCES

Examples of trade-related indicators found in the excel database accompanying the paper:

- **SDG indicator 15.7.1 : Proportion of traded wildlife that was poached or illicitly trafficked**
- **Intellectual property rights (IPRs) (patent, trademark, design) applications in bioeconomy subsectors (number of application per 1 000 employees)**
- Terms-of-Trade of biomass (export/import)
- Change in wood net trade
- Change in cropland-based biomass product net trade
- Illegal logging and associated trade
- FAOstat Detailed trade matrix (fertilizers) - Import value
- **FAOstat Forestry Production and Trade - Export Value**
- **Namibia strategy: Number of bioproducts trade agreements active**
- Namibia strategy: Number of business trade fairs and conventions involving bio-resource producers organised
- Namibia strategy: Number of entrepreneurs and business owners who attended the business trade fairs and conventions
- **KMGBF: Forestry Production & Trade (Wood Fuel)**
- **KMGBF: Trends in the legal trade of medicinal plants**
- KMGBF: Number of countries incorporating trade in their national biodiversity policy
- KMGBF: Trends of trade and commercialization in biodiversity-based products that is sustainable and legal (in line with BioTrade Principles and/or CITES requirements)

SECTOR AND INVESTMENT LEVEL – EXAMPLE OF BIOENERGY

EX-ANTE - BEFS Assessment Approach



EX-POST - GBEP Sustainability Indicators

ENVIRONMENTAL

1. Life-cycle GHG emissions
2. Soil quality
3. Harvest levels of wood resources
4. Emissions of non-GHG air pollutants, including air toxics
5. Water use and efficiency
6. Water quality
7. Biological diversity in the landscape
8. Land use and land-use change related to bioenergy feedstock production

SOCIAL

9. Allocation and tenure of land for new bioenergy production
10. Price and supply of a national food basket
11. Change in income
12. Jobs in the bioenergy sector
13. Change in unpaid time spent by women and children collecting biomass
14. Bioenergy used to expand access to modern energy services
15. Change in mortality and burden of disease attributable to indoor smoke
16. Incidence of occupational injury, illness and fatalities

ECONOMIC

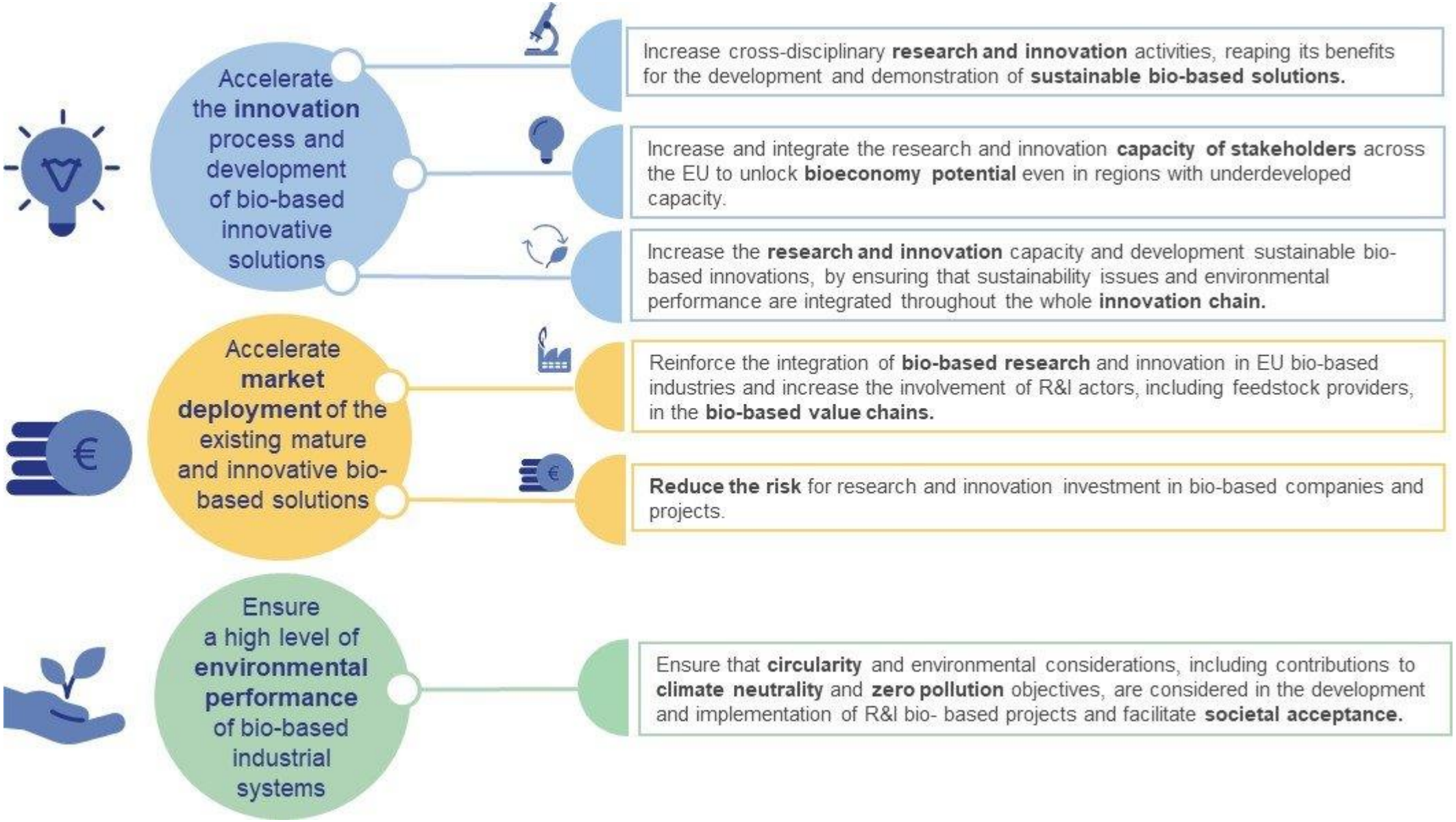
17. Productivity
18. Net energy balance
19. Gross value added
20. Change in consumption of fossil fuels and traditional use of biomass
21. Training and re-qualification of the workforce
22. Energy diversity
23. Infrastructure and logistics for distribution of bioenergy
24. Capacity and flexibility of use of bioenergy

- Need to take into account the **trade-offs and synergies** between different growing demands on biomass for bioeconomy products (including circular uses of biomass)

SECTOR AND INVESTMENT LEVEL – EXAMPLE OF CBE JU

Funding materials made from waste in an innovative way

General and specific objectives of CBE JU, as per Article 46 of the Council Regulation (EU) 2021/ 20856 of 19.11.2021



APPLICATIONS OF THE P&C PROJECT LEVEL DESIGN AND REVIEW– EXAMPLE OF BIOECONOMY REVIEW

Bananas in Pakistan's Bioeconomy: Transforming Waste into Textile

Integrating Bioeconomy and Tourism for Sustainable Vanuatu

SOCIAL CRITERIA (✓ = The criterion is covered) / CASE STUDIES	C.1.1 FOOD SECURITY AND NUTRITION ARE SUPPORTED	C.1.3 ADEQUATE LAND RIGHTS AND RIGHTS TO OTHER NATURAL RESOURCES ARE GUARANTEED	C.1.4 FOOD SAFETY, DISEASE PREVENTION AND HUMAN HEALTH IS ENSURED	C.3.2 INCLUSIVE ECONOMIC GROWTH IS STRENGTHENED	C.4.1 THE SUSTAINABILITY OF URBAN CENTERS IS ENHANCED	C.4.2 RESILIENCE OF BIOMASS PRODUCERS, RURAL COMMUNITIES AND ECOSYSTEMS IS DEVELOPED AND/OR STRENGTHENED	C.6.1 POLICIES, REGULATIONS AND INSTITUTIONAL SET UP RELEVANT TO BIOECONOMY SECTORS ARE ADEQUATELY HARMONIZED	C.6.2 INCLUSIVE CONSULTATION PROCESSES AND ENGAGEMENT OF ALL RELEVANT SECTORS OF SOCIETY ARE ADEQUATE AND BASED ON TRANSPARENT SHARING OF INFORMATION	C.7.1 EXISTING KNOWLEDGE IS ADEQUATELY VALUED AND PROVEN SOUND TECHNOLOGIES ARE FOSTERED	C.10.1 COOPERATION, COLLABORATION AND SHARING OF RESOURCES, SKILLS AND TECHNOLOGIES ARE ENHANCED WHEN AND WHERE APPROPRIATE
BIOCHAR PRODUCTION AND USE, GHANA	✓	-	✓	✓	-	✓	✓	✓	✓	✓
BIOMASSWEB, SUB-SAHARAN AFRICA	✓	✓	-	✓	-	✓	✓	✓	✓	✓
INTEGRAL USE OF OIL PALM, GHANA	✓	✓	-	✓	-	-	✓	✓	✓	✓
SEAWEED VALUE ADDITION, UNITED REPUBLIC OF TANZANIA	✓	✓	✓	✓	-	✓	✓	✓	✓	✓

- **The 10 Aspirational Principles and 24 Criteria for a sustainable bioeconomy agreed by the ISBWG** are used to identify win-wins and trade-offs in bioeconomy interventions/ projects.
- They are the main structure of FAO guidance documents to show what works in bioeconomy implementation.

- LINK TO EXCEL DATABASE

THANK YOU

ADDITIONAL INFORMATION

Bioeconomy@fao.org

www.fao.org/in-action/sustainable-and-circular-bioeconomy/en

Food and Agriculture Organization of the United Nations