Indicators to Monitor and Evaluate the Sustainability of Bioeconomy

ALMONA TANI

POWER4BIO Trainings
7 July 2020

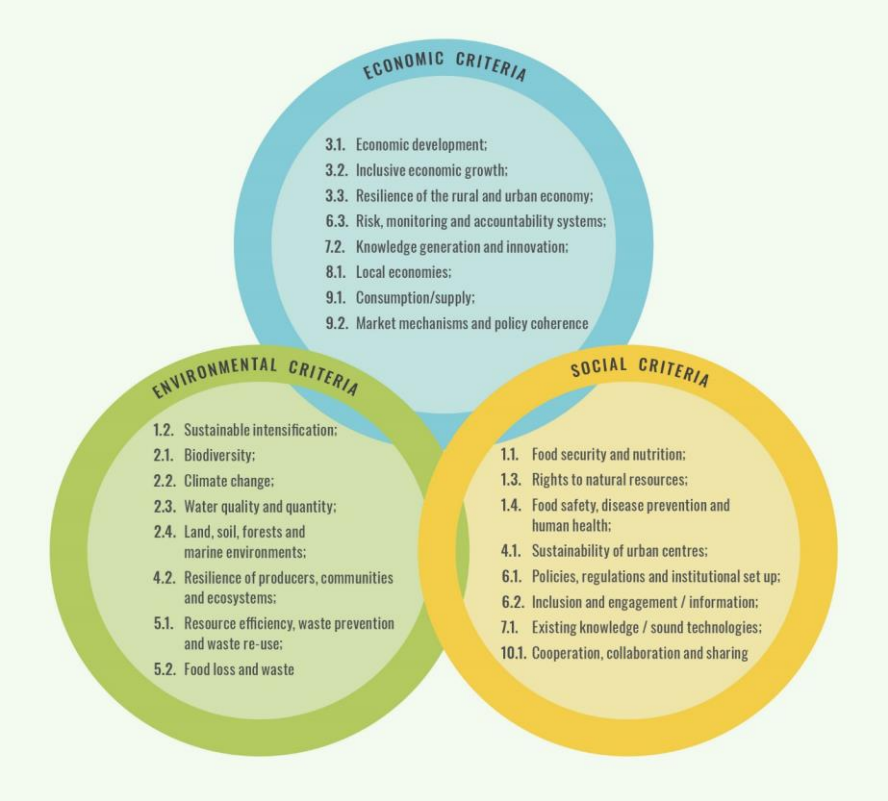
Food and Agriculture Organization of the United Nations

FAO's work on Bioeconomy

- In 2015, FAO received the mandate to coordinate the international work on sustainable bioeconomy by 62 Ministers of Agriculture at the Global Forum for Food and Agriculture (GFFA).
- The Government of Germany supports FAO through the project "Towards Sustainable Bioeconomy Guidelines" (Phase 1: 2016; Phase 2: 2017- 2021).
- The International Sustainable Bioeconomy Working Group (ISBWG) was created.
- In 2019, FAO, together with the JRC of the EC, received a mandate from the International Bioeconomy Forum (IBF) to develop a guidance note on an internationally coherent monitoring system for bioeconomy.

P&C for Sustainable Bioeconomy

- In 2016, the ISBWG agreed on a set of 10 aspirational Principles and related Criteria (P&C).
- They cover the 3 sustainability dimensions: economic, social and environmental.
- The P&C are points of reference for the “Towards Sustainable Guidelines” project.
- They serve as a framework for FAO’s monitoring and evaluation (M&E) of sustainable bioeconomy.



Sustainable Bioeconomy Indicators

- **Aim:** To provide technical assistance to countries and stakeholders in monitoring and evaluation of the sustainability of bioeconomy.

- **Principle:** Avoid replication and build on what is already available and/or countries may already report on (e.g. SDGs).

- **Steps of the Analysis**

Review of Monitoring Approaches

- Two scales of analysis:
  - Territorial approach
  - Product/value chain approach
- Several frameworks to rely on in terms of indicators and data:
  - National approaches
  - EU research projects
  - UN leading projects
- Keep the M&E simple but still internationally recognized and scientifically robust
  - SMART indicators
  - SDG indicators
  - Indicators from Standards, certificates and labels

Examples of indicators at territorial level

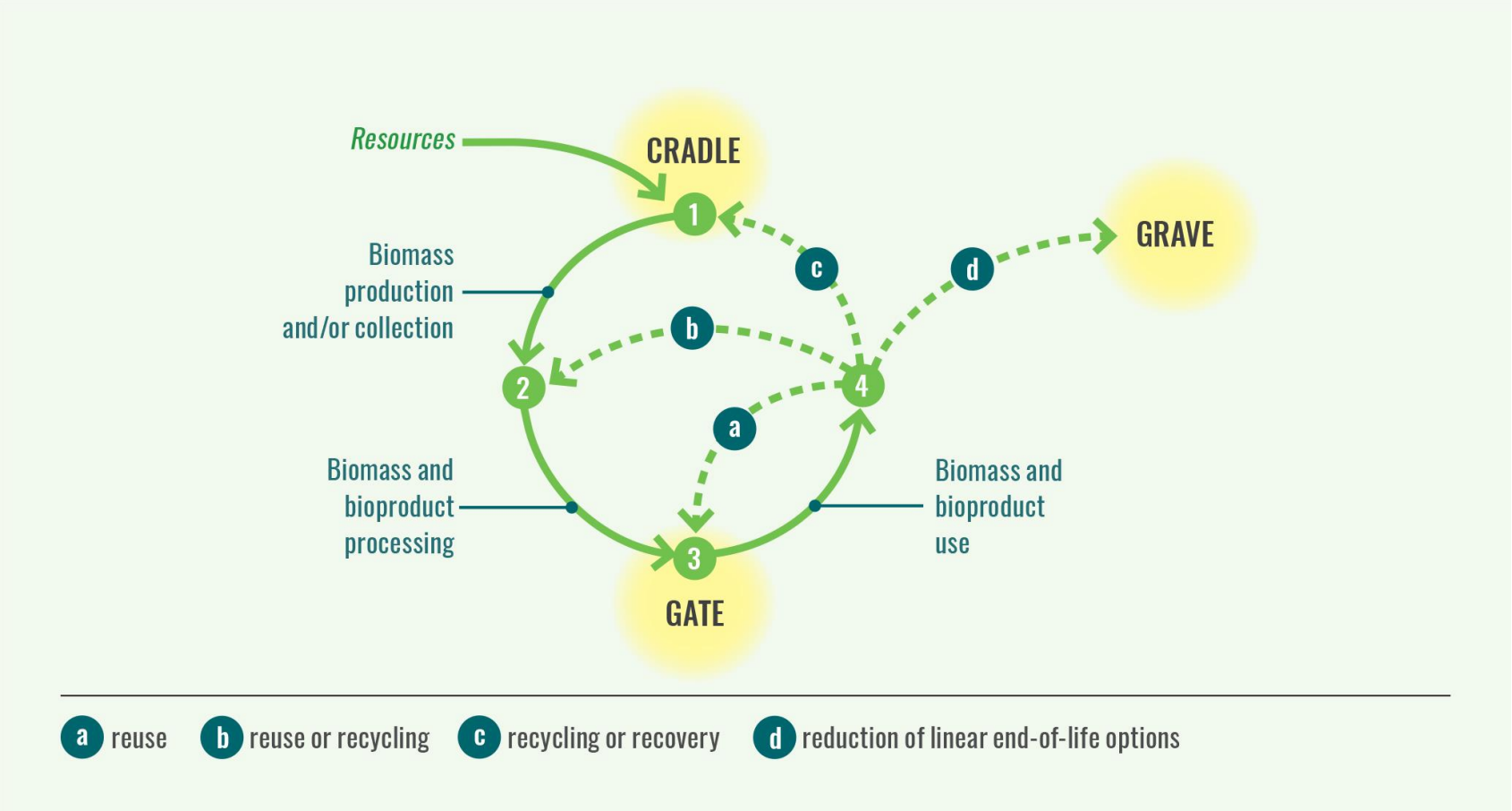
2.1. BIODIVERSITY CONSERVATION IS ENSURED	2.1.a Biodiversity conservation	Rate of biodiversity loss [3; 7; 10; 15]
		Rate of habitat loss (forest and agriculture) [15]
		Rate of forest fragmentation [15]
		Protected areas and land with significant biodiversity values, and biodiversity conservation and management [9; 18]
		Proportion of fish stocks within biologically sustainable limits / Share of sustainably fished fish populations (SDG 14.4.1) [5; 13; 14; 17]
		SDG 15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type [16]
		SDG 15.4.1 Coverage by protected areas of important sites for mountain biodiversity [5]
		SDG 15.5.1 Red List Index [5]
		SDG 15.8.1 Proportion of countries adopting relevant national legislation and adequately resourcing the prevention or control of invasive alien species [5]

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; $; and percentage) [7]
		Change in food price volatility [10; 15]
		Change in food prices [10; 15]
		Change in demand for foodstuffs for food, feed, and fibre [7]
		Changes in the import and export of foodstuffs ($) [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]

7.2. KNOWLEDGE GENERATION AND INNOVATION ARE PROMOTED	7.2.b Research and innovation	Investment in R&D ($) [13]
		R&D expenditure [index (EU=1)] [2; 10]
		SDG 9.5.1 Research and development expenditure as a proportion of GDP [5]
		Proportion of total research budget allocated to research in the field of marine technology (SDG 14.A.1) [14]
		Private and public spending on research and development [17]
		SME birth rate (% of total firms) [2]
		As a measure of green technology innovation, patent publication in environmental technology by filing office (% of total patents) [18]
		R&D employment (% of total employment) [2; 10]
		Commercialization of innovative technologies (sales of innovation products) [2]
		Key enabling technology (KET) R&D focus [2]

Colour code: Economic Social Environmental

Stages of a circular value chain



Examples of indicators at product/value chain level

		SECTOR-BASED PRODUCT/VALUE CHAIN INDICATORS (UNIT) [SOURCE]							
		PRIMARY SECTORS	SECONDARY SECTORS						
		AGRICULTURE, FORESTRY, FISHERY	FOOD AND AGROINDUSTRY	BIO-BASED CONSTRUCTION MATERIALS & FURNITURE	PULP AND PAPER	BIO-BASED TEXTILES	BIO-BASED CHEMICALS AND POLYMERS (INCL. BIOMATERIALS)	HEALTHCARE AND BIO-PHARMACEUTICALS	BIOENERGY
1.2. SUSTAINABLE INTENSIFICATION OF BIOMASS PRODUCTION IS PROMOTED	1.2.a Domestic biomass production	-	-	-	-	-	-	-	-
	1.2.b Yield/ agricultural productivity	Estimated amount of organic or mineral fertilizers and pesticides used (kg) [2; 4; 13; 16]	-	-	-	-	-	-	-
		Presence of an irrigation and water distribution system that optimize crop productivity (yes/no) [13]	-	-	-	-	-	-	-
		Biotic production potential (BPP: Capacity of ecosystems to produce biomass) (kg) [18]	-	-	-	-	-	-	-
		Number of agricultural practices that optimize productivity and input use efficiency [13]	-	-	-	-	-	-	-
	1.2.c Land for biomass production	Ha of land for agriculture occupied for biomass production (ha/biomass production unit) [10; 18]	-	-	-	-	-	-	-
2.4. THE DEGRADATION OF LAND, SOIL, FORESTS AND MARINE ENVIRONMENTS IS PREVENTED, STOPPED OR REVERSED	2.4.i Hazardous substances in production and processing	-	-	-	% of biodegradable surfactants [7]	-	-	-	-
		-	-	-		-	% of peat [7]	-	-
		-	-	-	% of polycyclic aromatic hydrocarbon (PAH) in the washing agents' products [7]	-	% of polycyclic aromatic hydrocarbon (PAH) [7]	-	-
		-	-	% of flame retardants [7]	-	-	-	-	-
		-	-	% of plasticisers [7]	-	-	-	-	-
		-	-	% of VOC content in surface treatment [7]	-	-	-	-	-
		Presence of additives with toxic effect on microorganisms in soil (yes/no) [6]	-	-	-	-	-	-	-
		Hazardous chemicals use reduction [5]							
		-	% of product materials produced and managed to high environmental and social standards [5]						
		-	Concentration of heavy metals in paints, primers and varnishes (µg/l) [3: 5: 7]						

Lessons learnt

- The indicators identified in the literature review, although quantitatively relevant, are unequally distributed among the various principles and criteria, as well as sectors.
- Data for many indicators are often not collected on a regular basis and data quality is a key problem for the estimation of some indicators. The study suggests the use of proxy indicators as a complement to detailed measurement.
- The attribution of either statistical data or general effects to the bioeconomy is challenging because of the complex and interconnected nature of bioeconomy.
- Particular attention should be payed to trade-offs and synergies between the different sustainability issues.

Can we provide some general guidance on how to develop transparent and comparable monitoring frameworks for sustainable bioeconomy?

Way forward

- Build on a participatory approach.
- Flexibility to reflect circumstances and specific needs of the stakeholders.
- Facilitate the inclusion of new indicators in order to improve the monitoring approach over time, and to adapt indicators as the sector and/or policy needs evolve.

Food and Agriculture Organization of the United Nations

Federal Ministry of Food and Agriculture

Thank you!

For further information: almona.tani@fao.org