

2. INTRODUCTORY NOTE ON VALUATION FRAMEWORK

I. Introduction: the need for a universal framework

As a project, TEEBAgriFood seeks to “evaluate all significant externalities of eco-agri-food systems, to better inform decision-makers in governments, businesses and farms.”¹

But how do we set out to do that? There exist a wide range of crops, agricultural systems, and supply chains, each with its own set of impacts and dependencies that need to be assessed, and a wide range of economically visible, and more importantly, invisible positive and negative externalities that need to be accounted for. How do we ensure that these evaluations are consistent and comparable?

The valuation framework described in this document offers a useful starting point, as it seeks to provide both a common understanding of what such an evaluation might entail, as well as a cross-cutting template for carrying out such an evaluation. In other words, each type of food system, production alternative, or consumer choice could be held to a common form of assessment of costs and benefits by using a single universally applicable framework.

This note briefly presents the framework that was developed during the writing of the interim report². While this framework highlighted the various externalities and impacts that need to be accounted for, the next stage of the TEEBAgriFood project would develop it further, asking fundamental questions on how these externalities and impacts can be measured across systems, and how results can be mainstreamed into public and private decision-making.

Value-Chain Stages Visible and Invisible flows	Production			Processing and Distribution			Consumption	
	Landscape	Infrastructure and Manufacturing	Farm	Wholesale	Food and Beverage	Retail	Industry/ Household/ Hospitality	Waste
Captured by System of National Accounts (SNA) (Profits, Wages, Taxes net of Subsidies, etc.)								
Provisioning (Materials, Energy, etc.)								
Regulation and maintenance (Soil, Water, Habitat for biodiversity, etc.)								
Cultural (Heritage, Recreation, etc.)								
Health (Nutrition, Diseases, Antibiotic resistance, etc.)								
Pollution (Nitrates, Pesticides, Heavy metals, etc.)								
Emissions (CO ₂ , CH ₄ , etc.)								
Social values (Food security, Gender equality, etc.)								
Risks and uncertainties (Resilience, Health, etc.)								

II. A look at the TEEBAgriFood valuation framework

The figure above displays the valuation framework as a matrix, to enable a structured evaluation of all material impacts and externalities along different stages of the value chain. The title row at the top includes the typical stages within an agricultural value-chain. The title column on the left lists the various significant, but often invisible, and visible flows that need to be captured for a comprehensive assessment. The discussion below explains these terms in further detail; there is also a **glossary** at the end of this document that provides definitions for these terms. In the next phase of TEEBAgriFood we hope to not only identify appropriate ways to measure the contribution of each of these flows, but also

¹ Mission statement of TEEBAgriFood. TEEB (2015) TEEB for Agriculture and Food: an interim report, UNEP, Geneva, Switzerland.

² The Framework has also been presented prior at the expert workshop in Brussels on 8-11 September 2015.

determine where they occur in the value chain, and suggest how they can be recognized and captured in private and public decision-making.

a. Value chain stages

The first row lays out the entire lifecycle and the various sequential stages in agricultural value chains that need to be considered to comprehensively assess eco-agri-food systems, i.e. ‘production’, ‘processing and distribution’, and ‘consumption’. This is to ensure that not only impacts arising from production can be accounted for, but downstream impacts, such as health impacts of consumption, can also be captured.

A value chain perspective can also allow policymakers, citizens, and businesses to identify the various points in the value chain where the most significant impacts (both positive and negative) occur.

b. Invisible and visible flows

Invisible and visible flows refer to both inflows and outflows of agriculture, some of which are accounted for by decision-makers, and some not. The first of these are visible flows that are captured by system of national accounts – wages and profits for example. The next three cells relate to ecosystem services flows (as identified by the CICES classification), such as pollination, provisioning of food, and raw materials. Agricultural systems both depend on and impact the delivery of these flows. Some of these are intermediate flows, such as nutrient cycling, which become visible as part of yields, but for management purposes largely remain invisible in decision-making. The next three rows identify health, pollution, and emissions to capture related impacts from agricultural systems, many of which go beyond the farm level. The last two items in this column provide for the evaluation of social values, and risk and resilience factors associated with agriculture, which do not lend themselves to monetization, or should not be monetized for strong ethical reasons. For example, important social criteria, such as how much of the food produced helps address local food insecurity, or to what extent a particular system improves or worsens the lives of women, or the extent to which it inflicts cruelty to animals may need to be evaluated, but not be monetized. Lastly, while comprehensive research on risks and uncertainties associated with certain practices may not be readily available, these would need to be discussed qualitatively in order to apply the precautionary principle³.

c. “Value addition”

The framework uses “value addition” as the main yardstick for measuring externalities/ impacts/ dependencies. Value addition can generally be defined as “the contribution of invisible and visible flows to human well-being” which, in this context, refers to their (positive or negative) impacts along the agricultural value chain. Using the term “value addition” allows for – 1) consistency across terms such as invisible and visible flows/impacts/ dependencies/ externalities; and 2) comparisons of these flows with what is already captured by businesses and governments, through corporate reporting, and SNA respectively⁴.

Therefore, in the above framework, we have identified two types of flows – those captured in SNA (e.g. wages and profits), and those not captured in SNA (such as ecosystem services inputs into production, and negative and positive externalities and impacts of agricultural systems). For example, services such as rainfall and pollination, which are inputs to agricultural production, deliver *positive*

³ TEEB Ecological and Economics Foundations, Chapter 5

⁴ At the business level, value addition is a measure of operating profit, i.e. sum of factor returns and surplus generated by firms over and above their purchases from other firms. At the national level, a System of National Accounts (SNA) incorporates value addition through the income approach of calculating a Gross Domestic Product (GDP) indicator, which is the sum of compensation of employees, taxes less subsidies on production, and the operating surplus of the producer (International Monetary Fund (2007) ‘The system of macroeconomic accounts statistics: an overview’, *Pamphlet Series No. 56*, IMF, Washington DC).

value additions. On the other hand, negative impacts of agricultural production, such as water pollution and loss of biodiversity⁵, deliver *negative* value additions.

Lastly, since the framework includes elements captured in SNA, contributions of nature to agriculture, and contribution of agriculture to societies, it recognizes the role of all four capitals in generating value: *physical capital* (e.g. financial resources, machinery, buildings, etc), *human capital* (e.g. people, their health, skills and knowledge), *social capital* (e.g. trust, norms and institutions) and *natural capital* (e.g. minerals, forests, and land)^{6,7,8,9,10}

All “value addition” components are made explicit in the valuation framework to ensure that each is given due attention, but they are not always additive. This is for various reasons.

Firstly, some of the value additions, in the form of regulation and maintenance services, are intermediate flows that contribute towards the provisioning of certain final value additions. For example, regulation of soil fertility is an intermediate (invisible) flow that contributes to the provisioning of (visible) food yields. Adding both of these flows would be double counting. However, these are effectively decoupled in the framework, due to the importance of recognizing the role and ability of ecosystems in delivering these intermediate flows over time for sustainable planning and public policy.

Secondly, as pointed out above, while some value additions can be measured in financial terms, others simply cannot. For example, while water provisioning services can be quantified, cultural flows that add to social capital are qualitative. While these are not additive, the recognition of these flows, independently, is nonetheless important for assessing trade-offs between different food systems.

Lastly, value additions may generate secondary value additions. For example, wages, a form or primary value addition generated at the farm, may be invested in the local economy, which can generate secondary value additions. While the TEEBAgFood framework does not include secondary value additions, appropriate multipliers may be used to assess these if required, depending on context.

d. Beyond value addition

While the metric of value addition is suggested to capture values, the eco-agri-food systems complex has significant implications for sustainability and equity. It is important to acknowledge that limiting evaluations to the yardstick of ‘value addition’ alone does not address important equity and resilience issues. Thus additional “social” and “resilience” indicators of value (both quantitative and qualitative) for different models of agriculture, including the following, may be used:

- Number of jobs provided by a particular type of agricultural production;
- Percentage and wage parity of jobs provided to women;
- Agricultural income as a fraction of household income in poverty-affected areas;
- Food output distributed to food-insecure areas as a fraction of total farm output;
- Risks and uncertainties related to human health posed by different agricultural systems
- Cruelty to animals in certain types of animal husbandry systems

⁵ Dale V. & Polasky S. (2007) ‘Measures of the effects of agricultural practices on ecosystem services’, *Ecological Economics*, 64(2): 286-296.

⁶ Pearce, D., Atkinson, G., & Dubourg, W. (1994) ‘The Economics of Sustainable Development’, *Annual Review of Energy and the Environment*, 19: 457-474.

⁷ Serageldin, I. (1996) ‘Sustainability and the wealth of nations: first steps in an ongoing journey’, *Environmentally sustainable development studies and monographs series - no. 5*ESSD Environmentally & Socially Sustainable Development Work in Progress*, World Bank, Washington, D.C.

⁸ World Bank (2006), *Where is the wealth of nations - Measuring capital for the 21st century*, World Bank, Washington DC.

⁹ International Integrated Reporting Council (2013), ‘Capitals - Background Paper for <IR>’, IIRC.

¹⁰ Joint UNECE/EuroStat/OECD Task Force on Measuring Sustainable Development (2013) *Framework and suggested indicators to measure sustainable development*.

Including these variables would also contextualize agricultural systems within economic or development policy, highlighting the various hidden costs and benefits of eco-agri-food systems, such as value of smallholder farming systems for both employment generation and food security.

III. Using the framework

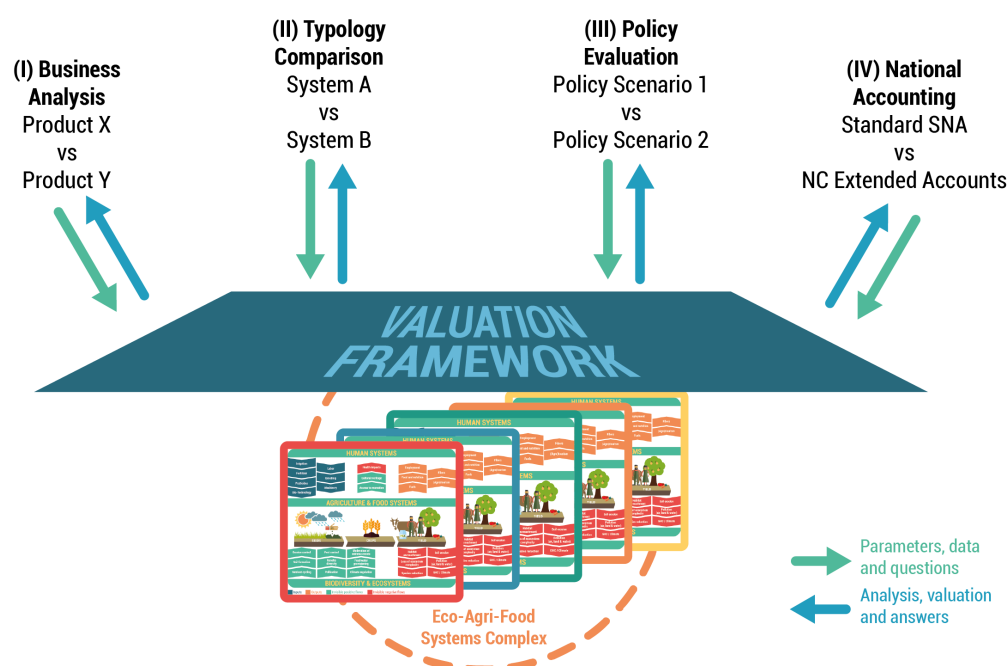
a. Who will use it?

It is expected that this proposed framework would allow consumers, policymakers, and businesses to recognize, and where appropriate, capture the hidden flows within the eco-agri-food systems complex in their decision-making. This framework is a lens (Fig 2) that allows us to make the invisible visible: it helps to evaluate the impacts and dependencies of these important flows, which have mostly been treated as non-existent by decision-makers.

b. How will it be used?

The framework provides a structure and an overview of what should be included in an analysis, but does not prescribe *methods for valuation*. Methods of valuation will depend on the values to be assessed, availability of data, and the purpose of the analysis.

The *approach* to valuation will always be context-specific and will depend on the application being considered. For example, recent applications of valuation have emerged in the context of policy, business and national accounting^{11,12,13,14}.



¹¹ World Business Council for Sustainable Development (2009) *Guide to Corporate Ecosystem Valuation - a framework for improving corporate decision-making*, WBCSD, Geneva.

¹² United Nations Statistics Division (2013) 'System of Environmental Economic Accounting (SEEA) Experimental Ecosystem Accounting', accessed on 18 November 2015 [http://unstats.un.org/unsd/envaccounting/eea_project/default.asp].

¹³ World Bank (undated) 'Wealth Accounting and the Valuation of Ecosystem Services' (WAVES), accessed on 18 November 2015 [<http://www.wavespartnership.org/>].

¹⁴ TEEB (undated), 'TEEB Country Studies', accessed on 18 November 2015 [<http://www.teebweb.org/areas-of-work/country-studies-home/>].

Lastly, while the framework itself does not prove or establish causal relationships between the various value chain components – such as how consumption affects production, or how ecosystems affect farms. It can be used in a systems dynamic approach, wherein value additions can be determined across spatial and temporal scales.

IV. Looking forward

Since dominant models of agricultural management are largely focused on using the common yardstick of profit, the data we seek may not be readily available. However, by establishing this valuation framework, we also wish to establish (as well as respond to) the need for necessary further research to obtain and use such data in appropriate policy and management contexts. In the next phase of TEEBAgriFood, we hope to not only identify appropriate ways to measure the contribution of each the various invisible flows, but also determine where they occur in the value chain, and suggest how they can be recognized and captured in private and public decision-making.

GLOSSARY

Consumption	The final stage of the agricultural value chain, which includes consumption of agricultural goods by industries, households, and businesses, and also waste disposal
‘Cultural’ ecosystem services*	Physical, spiritual, symbolic and intellectual interactions with biota, ecosystems, and land/ seascapes
Emissions	The production and discharge of greenhouse gases from the agricultural sector
Farm	During the ‘production’ stage, this is the spatial unit that makes up the boundary within which food and/or livestock is grown and/or reared
Food and Beverage	During the ‘processing and distribution’ stage, this refers to the industry that processes, packages, and distributes food and beverage products
Health	Refers to human health impacts, both positive and negative, generated along the agricultural value chain
Hospitality	The food services industry such as restaurants and hotels
Household	People in a family or other group, living together in one house
Industry	During the ‘consumption’ stage, industry refers to the consumption of agricultural goods by businesses
Infrastructure and manufacturing	During the ‘production’ stage, this comprises all human-made infrastructure that generates farm inputs, such as dams, irrigation canals, and factories that generate chemical inputs
Landscape	During the ‘production’ stage, this is the spatial unit where impacts from – and on – ecosystem services are generated – typically a watershed.
Pollution	The release of harmful and toxic substances into the environment
Processing and Distribution	The second stage of the agricultural value chain where goods are processed into consumables, packaged, and/ or distributed
Production	The first stage of the agricultural value chain where agricultural commodities are produced
‘Provisioning’ ecosystem services*	All nutritional, material and energetic outputs from living systems
‘Regulating and Maintenance’ ecosystem services*	All the ways in which living organisms can mediate or moderate the ambient environment that affects human performance
Retail	During the ‘processing and distribution’ stage, this is the sale of agricultural goods for consumption

Risks and uncertainties	These include the often invisible dimensions of food systems – this can include, for example, human health risks posed by certain food systems, or uncertainties around tipping points of ecosystems
Social values	Refers to non-economic values generated by agriculture, desirable for social cohesion and development – food security and gender equality for example
System of National Accounts (SNA)	Refers to the internationally agreed standard set of recommendations on how to compile measures of economic activity at the national level
Value addition	The contribution of invisible and visible flows to human well-being through their positive (or negative) impacts along the agricultural value chain
Visible and invisible flows	Both inflows and outflows of agriculture, some of which are accounted for in policies and national accounts (visible), and others that are not (invisible).
Waste	During the ‘consumption’ stage, this is the food waste produced by businesses and households
Wholesale	During the ‘processing and distribution’ stage, this is the sale of agricultural goods in large quantities for processing

** As defined by the Common International Classification of Ecosystem Services (CICES)*