

3. BACKGROUND MATERIALS

The Economics of Ecosystems and Biodiversity (TEEB¹) is a global initiative focused on drawing attention to the economic benefits of biodiversity including the growing cost of biodiversity loss and ecosystem degradation. TEEB presents an approach that can help decision-makers recognize, demonstrate and capture the values of ecosystem services and biodiversity.

The 'TEEB for Agriculture and Food' (TEEBAgriFood²) study seeks to review the economic interdependencies between human (economic and social) systems, agriculture and food systems, and biodiversity and ecosystems. In doing so, it addresses the economic invisibility of many of these links while exploring how biodiversity and key ecosystem services deliver benefits to the agriculture sector and also beyond, itself being a key contributor to human health, livelihoods and well-being.

A major output of TEEBAgriFood is a 'Scientific and Economic Foundations' report³, which addresses the core theoretical issues and controversies underpinning the evaluation of the nexus between the agri-food sector, biodiversity and ecosystem services and externalities including human health impacts from agriculture on a global scale. As part of this research, authors have developed an Evaluation Framework⁴ that provides broad categories of all interactions that may exist within a given 'eco-agri-food system'.

Since the launch of the report in June 2018, the focus of the TEEBAgriFood community of practice has been on shifting from analysis to action by "pilot-testing" several applications of the Framework.

1. Introduction to the TEEBAgriFood Evaluation Framework
2. Framework-testing studies
3. Country implementation

¹ www.teebweb.org

² www.teebweb.org/agrifood

³ www.teebweb.org/agrifood/home/scientific-and-economic-foundations-report

⁴ www.teebweb.org/agrifood/home/evaluation-framework/

3.1 Introduction to the TEEBAgriFood Evaluation Framework

Why use the TEEBAgriFood Evaluation Framework?

Most current assessments of agricultural and food systems are partial and ignore a number of important relationships that eco-agri-food systems have with our economy, society, environment, and health. Examples of partial assessments include farm level assessments of productivity on the basis of yield per hectare only or assessments of environmental efficiency that cover the agricultural production chain but focus only on water or energy use. Such assessments, while clear in scope, leave out broader issues of sustainability and equity that are fundamental considerations in assessing food systems.

Thankfully, discussion is growing around new approaches to assessing eco-agri-food systems including the use of sustainability indicator sets, the measurement and valuation of ecosystem services as inputs to food systems, and the assessment of the connections between food and population health. The perspective of the TEEBAgriFood Evaluation Framework is that these types of approaches need to be integrated in order to better inform policy decisions. Assessments that are context specific and which consider a comprehensive set of interactions, as described in the Framework, will ensure that decision making about food systems captures all material interactions between environment, economy, society, and health and covers interactions from the farm to household consumption.

What does the Framework include?

The Framework includes four elements - stocks, flows, outcomes and impacts- which capture the set of interactions (see **Figure 1**). The **stocks** of eco-agri-food systems comprise the four different "capitals" – produced capital, natural capital, human capital and social capital. These stocks underpin a variety of **flows** encompassing production and consumption activity, ecosystem services, purchased inputs and residual flows. The dynamics of an eco-agri-food system lead to **outcomes** that are reflected in the Framework as changes in the stocks of capitals, both quantitatively and qualitatively. In turn, these outcomes will have **impacts** on human well-being.

By providing key definitions and associated measurement concepts and boundaries, the TEEBAgriFood Evaluation Framework establishes **what** aspects of eco-agri-food systems may be included within a holistic evaluation. The chapter does not focus on **how** assessments should be undertaken, nor does it prescribe methods for assessments. The choice of methods will depend on the focus and purpose of any given assessment, the availability of data, and the scope of analysis.

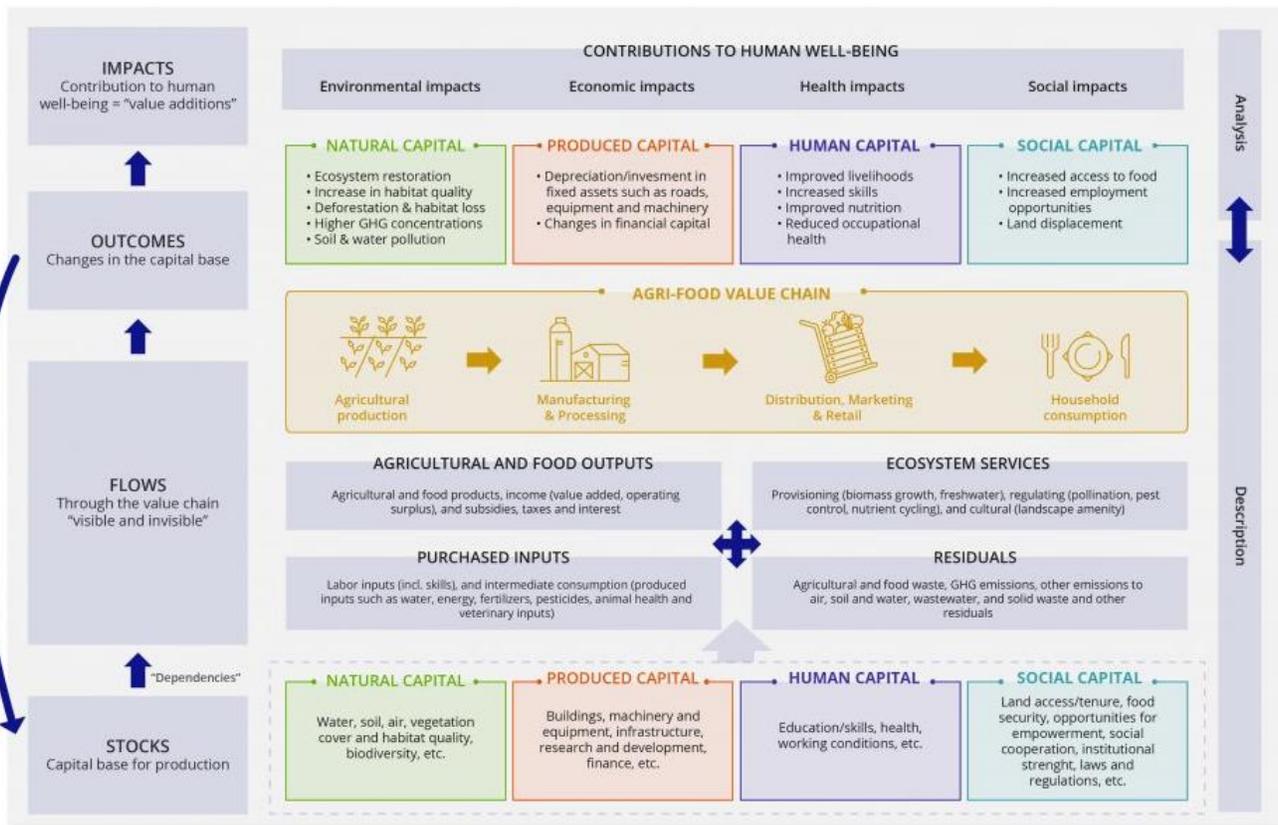


Figure 1 Elements of the TEEBAgriFood Evaluation Framework

What is the purpose and role of the Framework?

With these considerations in mind, the Framework identifies and characterizes *all* relevant elements of our eco-agri-food systems. Of course, eco-agri-food systems are heterogeneous with significant variation in terms of types of outputs, the nature of production systems and value chains. Further, there will be different purposes and perspectives for each assessment. By way of example, while health impacts at consumption stages for corn produced for corn syrup may be material, this would not be the case for corn produced for ethanol for use in biofuel production. Thus, not every possible combination of elements covered by the Framework will be relevant and material in every assessment.

The Framework has thus been designed to provide broad categories of all interactions that may exist within a given eco-agri-food system. This provides a clear and common starting point for all assessments as they work towards identifying the elements that are most material in their context.

While all assessments will have somewhat different coverage, it is also expected that all TEEBAgriFood based assessments have the following features. They should:

1. be broad and systemic in nature,

2. reflect the contributions of all four capitals and
3. examine connections along the full value chain, including assessing the impacts of food consumption on human health.

If these three features cannot be demonstrated, then the assessment would be considered a partial assessment and not consistent with the spirit of the TEEBAgriFood project.

How can the Framework be used for an evaluation or a study?

To demonstrate how the Framework may be used, the following steps may be followed:

1. **Determine the purpose of evaluation.** The purpose of the evaluation exercise may differ within and across groups such as researchers, businesses, or consumer groups. A clear articulation of purpose should be used to scope an assessment.
2. **Determine the entry point and spatial scale of analysis.** The entry point would depend on the research interest or focus of the study. Relatedly, appropriate spatial boundaries would need to be defined – within or across regions, countries etc.
3. **Determine the scope of the value chain under analysis.** This requires the researchers to understand the system and bring together relevant literature and sources to support their description of the value chain – from production to consumption.
4. **Determine the stocks, flows, outcomes and impacts most relevant for the purpose of the study.** The relevant aspects that should be considered through literature review and research are:
 - A. At each and every value chain boundary, identify the flows outlined in **Figure 1**. It is important to understand that these flows can help identify pathways through which the four capitals contribute to agri-food value chains, and how in turn agri-food value chains may impact the capital stocks. These may include waste or emissions generated along the way. This of course requires certain level of knowledge and research of the given system in question.
 - B. At each and every value chain boundary, identify the social, produced, natural, and human capital related outcomes of the system (**Table 1** provides some examples). This of course requires certain level of knowledge and research of the given system in question.
 - C. Evaluation of these two aspects requires an understanding and mapping of the spatial scales at which these interactions are happening – ecosystem services used at the farm level may be generated beyond the farm, for example. Similarly, health outcomes of a particular food product may happen well beyond the farm, especially if there is international trade.
 - D. Given these considerations, the assessment must identify the impacts that it is choosing to address and the ones it is excluding, and provide appropriate reasons.

5. **Select evaluation techniques.** While the first four steps provide the framing and scope of the evaluation, the next step is to choose the techniques that would help one assess and measure the interactions within a given system. For TEEBAgriFood, the focus is on assessing impacts as contributions to human well-being. Other evaluation methodologies may include life cycle assessment and value chain analysis, and various modelling tools and techniques including partial and general equilibrium models and system dynamics.
6. **Collecting data and undertaking the evaluation.** Once the context and methods for evaluation are set, efforts can be made to collect data. While data availability can be an important factor in defining the scope of assessments, by completing steps 1-5 prior, the implications of lack of data can be understood and can provide motivations for identifying and filling information gaps.
7. **Reporting and communicating findings.** Communicating the results of the evaluation exercise should be seen as an essential part of the process. Particular note should be taken of the need to develop a range of outputs to suit different audiences including politicians and business leaders, technical experts, farmers and local communities and the media.

To support the application and implementation of the Framework and the associated discussions among stakeholders, it may be useful to use the tables and text from section 6.3 of the chapter that explain the various components of the Framework. With this in mind, the table below provides a stylized version of the Framework in the form of a checklist that can be used by researchers and decision makers to consider the relevant interactions and to ensure awareness of those aspects excluded from an assessment.

Table 1 comprises two main sections: i) stocks/outcomes (changes in capital stocks), and ii) flows. Several of these elements may be measured differently – for example, in qualitative, quantitative or monetary terms. Impacts (value addition) elements are excluded from this table since the scope of measured impacts will relate directly to the scope of capital stocks, outcomes, and flows that are included in an assessment. The methodologies for assessing impacts are presented in the TEEBAgriFood 'Scientific and Economic Foundations' report, Chapter 7.

It is important to note that several of these elements would require a more detailed description and measurement depending on the scope and context of the assessment being conducted. For example, depending on the assessment, water may include coverage of both surface and ground water resources. Furthermore, quality indicators of water may include several other elements such as habitat quality or nutrient profile. Finally, it is not always the case that all components receive the same type of evaluation and measurement. Thus, in using the table to assess the coverage of an assessment, it will be relevant to distinguish as to whether a component is being assessed descriptively, quantitatively or in monetary terms.

Table 1 Sample checklist to assess coverage of a given eco-agri-food system application

EXAMPLE OF A CHECKLIST TO ASSESS COVERAGE OF A GIVEN TEEBAGRIFOOD FRAMEWORK APPLICATION		Value chain			
		Agricultural production	Manufacturing & processing	Distribution & marketing	Household consumption
Stocks / Outcomes (change in capital stock)					
Natural capital	Water (incl. quality, quantity)				
	Soil (incl. quality, quantity)				
	Air				
	Vegetation cover and habitat quality				
	Biodiversity				
Produced capital	Other				
	Buildings				
	Machinery and equipment				
	Infrastructure				
	Research and development				
Human capital	Finance				
	Other				
	Education / skills				
	Health				
Social capital	Working conditions (decent work)				
	Other				
	Land access/tenure (private, public and communal)				
	Food security (access, distribution)				
	Opportunities for empowerment (gender and minority)				
	Social cooperation (incl networks/unions)				
Flows	Institutions				
	Laws and regulations (e.g. child labor)				
	Other				
	Agricultural and food products				
	Income: value added, operating surplus				
Agricultural and food outputs	Subsidies, taxes and interest				
	Labour inputs (incl skills)				
	Intermediate consumption (produced inputs such as water, energy, fertilizers, pesticides, animal health and veterinary inputs)				
Purchased inputs	Provisioning (e.g. biomass growth, freshwater)				
	Regulating (e.g. pollination, pest control, nutrient cycling)				
	Cultural (e.g. landscape amenity)				
Ecosystem services	Agricultural and food waste				
	GHG emissions				
	Other emissions to air, soil and water				
	Wastewater				
	Solid waste and other residuals				
Residuals	Legend				
	Descriptive information available				
	Quantitative information available				
	Monetised information available				
Not included in study					

How does the Framework guide researchers, decision-makers (public or private), local communities, farmer groups and other users?

Utilizing a comprehensive and universal Framework provides a common basis to compare assessments, a tool for decision-makers to understand what information is missing, and a means to identify areas of further research.

Since it includes all categories of material interactions in a given food system, the Framework can offer entry points to many people – for example, researchers focusing on social impacts of food systems, can use social capital related outcomes as a starting point, and then make linkages to the other three capitals. Similarly, decision-makers can start at the economic elements, but then identify how these may be related to other capital stocks and flows. The Framework can also help decision-makers quickly identify any blind spots in the information base used to support decision-making. In essence, no matter what the starting point or purpose, the Framework can allow researchers to contextualize their assessments within the broader set of interactions that their food system has. This not only brings transparency to their assessments, but also highlights the opportunities to link their work with other research.

The TEEBAgriFood Framework can also be a starting point for identifying the material elements of particular systems, and thus can lead to the development of guidelines on comparable assessments. For example, similar firms, in terms of size and products, in the food and beverage sector could use this Framework to identify the main impacts and dependencies of their sector's operations. Similarly, organizations such as farmer cooperatives, consumer protection groups and local governments could elaborate the impacts and dependencies most relevant from their perspective. We encourage the adoption and adaptation of the Framework by diverse groups, and hope that over time, sector specific guidelines can emerge from the Framework.

Further, the Framework is intended for use in an interdisciplinary manner, where the questions to be analyzed, the options to be compared, and the scale, scope, and relevant variables included are determined in an open and participatory way. This engagement should occur before the appropriate assessment and valuation methods are implemented.

Overall, the Framework also allows for a broadening of our understanding and conversations around agricultural and food systems. Our aim is that international policies and targets increasingly begin to recognize the interlinkages, in terms of impacts and dependencies that food systems have with our economies, societies, health, and environment. In this task, using the Framework and its language can allow for the next generation of agricultural and food research to provide a more comprehensive basis for decision-making.

3.2 Framework-testing pilot studies

<http://teebweb.org/agrifood/projects/framework-pilots/>

Donor: Global Alliance for the Future of Food

Timeline: April/May 2019

A finalized version of the Framework was published in the 'Scientific and Economic Foundations' report in June 2018. The immediate next step was to move from analysis to action and commission pilot studies that use and apply TEEBAgriFood and its Framework on the ground. In addition to the country projects funded by the European Union (DG-DEVCO and Partnership Instrument) and German (BMU) International Climate Initiative, the two pilot studies described below were developed with support from the Global Alliance for the Future of Food to deliver quick feedback and results on the viability of the Framework. Preliminary results will be shared at the Symposium.

Soybean and cattle food chains in Brazilian Amazon

This study will examine the current structure, function and related externalities of two principal food supply chains operating in the Brazilian Amazon, with respect to two primary applications of the TEEBAgriFood Evaluation Framework:

- ***Farming typology comparison***

Evaluation of externalities arising from operations at different scales and enterprise mixes from smallholder cattle raising to large-scale ranching; and

- ***Alternative policy scenario evaluation***

Evaluation of the impact of "Business-as-Usual" (BAU) practices in large-scale soybean/maize and the aforementioned range of scales in cattle ranching on natural and human capital and associated flows; and

Simulation of actor response to adjustment in financing to reward restoration of degraded landscapes as part of livestock intensification and improved soy/maize practices

Wheat value chains in northern India

The proposed study looks to highlight the hidden costs and benefits of wheat cultivation in Punjab, on the basis of the TEEBAgriFood Framework. The study seeks firstly to develop a common assessment for conventional *versus* organic wheat cultivation systems practiced *and* for existing farm subsidies *versus* an alternative system of direct transfer payments to farmers. It will compare costs & benefits holistically, on the basis of economic, environmental, and human impacts, as well as social values and risks & uncertainties. This evaluation explores the possibility of delivering lower impact by correcting for policy failures, as farmers might automatically reduce input use (energy, water, fertilizer, pesticides) or may transition to sustainable alternatives.

3.3 TEEBAgriFood Country Implementation

International Climate Initiative (IKI): Supporting biodiversity and climate-friendly land management in agricultural landscapes in Colombia, Tanzania, Kenya and Thailand

Donor: Germany's International Climate Initiative (IKI) of the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMU)

Timeline: Dec 2019

Country focus: Colombia, Tanzania, Kenya, Thailand

Project webpage: <http://teebweb.org/agrifood/projects/iki/>

Overarching project goal

Biodiversity conservation and sustainable land use are mainstreamed into agricultural landscapes and seascapes. These may include large-scale and small-scale food production systems and traditional agroforestry systems. Through participative scenario development at landscape level, TEEB would assess the impacts of various land use decisions on ecosystem services and biodiversity.

Specific objectives:

- **Biodiversity:** The project will contribute to increased habitat connectivity and reduced land fragmentation, thereby reducing agriculture pressures on protected areas. It will do so by setting out evidence on the variability in ecosystem service provisioning and other visible benefits (such as employment and income generation) across different agro-ecosystems and farming systems at the landscape level. It will contribute to increased investment in the productive assets of the poor, such as soil, forests, fish, agro-biodiversity and water via enhanced awareness, knowledge and supporting evidence.
- **Climate change mitigation, conservation, restoration and sustainable use of natural carbon sinks:** The project will contribute to the implementation of GHG mitigation strategies in agricultural landscapes, a shift to sustainable food production systems and the reduction in harmful subsidies that contribute to climate change. It will contribute to policy-making through comparing and assessing GHG changes across different scenarios, and juxtaposing these inter alia with changes in ecosystem service provisioning.
- **Climate change adaptation:** The project will contribute to policy shifts towards climate smart agriculture, particularly investments in Ecosystem based Adaptation (EbA). TEEB will do so by using scenario analysis, highlighting the value of healthy ecosystems for adaptation. This may include recommendations for both land use and types of agricultural production systems that increase agricultural resilience, with a particular focus on EbA and smallholder farmers in biodiversity rich areas.

Expected outputs:

- TEEB Country study scope identified and validated through participatory approaches
- Assessment of biophysical and valuation data availability and gap analysis conducted

- Scenario analysis conducted: Proposed changes in policy modelled with respect to ecosystem service changes relative to Business As Usual
- Policy assessment and Theory of Change completed as an input to changes in policy and regulatory frameworks, land use planning, finance policies and production practices
- Dissemination and capacity-building activities carried out so as to enhance engagement, credibility and uptake

Country Focus

- Colombia (Putumayo department, deforestation pressures, indigenous peoples)
- Kenya (deforestation pressures on the Greater Mau Forest Ecosystem)
- Tanzania (TBC: land use change between pasture, crops, and plantation forests in the Southern Highlands area)
- Thailand (organic versus conventional rice production in the northern region)

European Union Partnership Instrument (EU-PI): Promoting a sustainable agriculture and food sector in Brazil, China, India, Indonesia, Malaysia, Mexico, Thailand

Donor: European Union Partnership Instrument (EU-PI)

Countries: Brazil, China, India, Indonesia, Malaysia, Mexico, Thailand

Period: Dec 2022

Project webpage: <http://teebweb.org/agrifood/projects/partnership-instrument/>

The core project goal is to stimulate biodiversity conservation and ecosystem service provisioning for agricultural landscapes for the seven countries in scope.

A series of actions could be taken to promote sustainable production practices, to be assessed as potential solutions:

1. Information-provision for farmers and agri-businesses is a key opportunity on the supply-side. **Agricultural extension** work is concerned with informing farmers of the opportunities to improve their production systems, i.e. to stimulate the adoption of innovations. To date it has been typically focused solely on yields per hectare as a performance metric, whereas the metrics to assess the sustainability of farming systems, whilst including average yield levels, also would include inter alia yield variability (which affects food security), impacts on biodiversity and ecosystem resilience (agriculture is impossible in the medium term without well-functioning ecosystems that ensure pollination of crops or biological control of plant diseases), and greenhouse gas emissions from agricultural production. Interventions have, to date, failed to consider the linkages and dependencies within the agri-food system and across agricultural landscapes; this project intends to do so in a holistic manner.
2. Whereas agricultural extension tends to entail information provision, dissemination and advocacy for changes in agri-food production systems from experts (agricultural engineers, hydrologists, plant scientists etc.) to farmers, an alternative is **peer-to-peer learning**. This has been particularly important in the adoption of agro-ecological practices, in part because agro-ecology is a social movement as much as it is a collection of management practices³. There is the potential – in the increasingly globally-connected world – for peer-to-peer learning not to be restricted to peers in the same locality, or even in the same country.
3. The application of **macro accounting** also provides an opportunity linked with information-provision. The Systems of Environmental-Economic Accounting Experimental Ecosystem Accounting (SEEA-EEA) is being applied under the 'Natural Capital Accounting and Valuation of Ecosystem Services' project in four of the countries in scope for the current project (Brazil, India, China, and Mexico). The application of SEEA-EEA entails two elements that might contribute to the current project with its focus on the agri-food sector: (i) the development of ecosystems extent and ecosystem condition accounts; and (ii) biodiversity and carbon accounts. SEEA-EEA is about looking back from the current time period, i.e. bringing together datasets from disparate sources and where applicable applying bio-physical and economic modelling so as to populate ecosystem accounts for (say) 2017 going back to 2010. The provision of these data and information can be informative for decision-making in that it reveals trends in changes in ecosystem condition and changes in land cover/land use which can signal to decision-makers that there is a need to focus on reform in the agri-food sector, particularly as one of the main causes globally of the loss of natural habitats is agricultural encroachment. However, in order to be informative, there is a need to *mainstream* the

outcomes of the statistical analysis of SEEA-EEA application, and this is a major component of the UN Environment/TEEB inputs to the 'Natural Capital Accounting and Valuation of Ecosystem Services' project. There are potential co-benefits/synergies between the SEEA-EEA project and the current project arising from mainstreaming those outputs of the SEEA-EEA project that are relevant to the agricultural sector for these four countries. UN Environment is also championing Inclusive Wealth Reporting, which looks at changes across a range of capital stocks. The Inclusive Wealth approach also presents an opportunity in that the information-provision includes natural capital but is not limited to natural capital – and stakeholders in business, government and civil society are also interested in promoting (for instance) the technical skills for upscaling agro-ecological practices, as captured in changes in human capital.

4. On the demand side, the establishment of **sustainability standards and certification** look at the environmental, social and economic performance of agricultural products across the supply chain. This approach takes advantage of the high interconnectivity between the EU and partner countries, highlighting the mutual impacts on consumers and producers, which are often found halfway across the world. Through these sustainability standards and certification, consumers can make informed decisions related to the products they are purchasing and the price premiums that they are willing to pay for goods that have a superior environmental and/or social performance. At the same time, consumers can send a clear message to producers regarding the market advantage of producing sustainability-certified products and enables preferential market conditions for such goods.
5. Market-based interventions including the establishment of a **Payment for Ecosystem Services** (PES) scheme wherein one/a group of beneficiaries directly compensate a second individual/group which is providing some benefit to them in terms of enhanced ecosystem service provisioning. For instance, upstream farmers might modify their production processes so as to increase the flow rate and quality of freshwater available to downstream users, the latter users compensating the upstream farmers.
6. This PES example pertains to locally-derived ecosystem services that have local beneficiaries. There are global initiatives that compensate ecosystem-service providers (including agents in the agricultural sector) for the provision of ecosystem services, an example being the **UN-REDD** which considers the provision of biodiversity benefits as a co-benefit to carbon sequestration⁴.
7. Other forms of market-based interventions include influencing the **banking sector**. This might range from stimulating the establishment of micro-credit facilities for smallholders to promote sustainability, all the way through to influencing the lending practices of major financial institutions such as Rabobank⁵ that lend to multinational processors in the agri-food sector. The Natural Capital Finance Alliance (NCFA)⁶ has an on-going work stream that is relevant.
8. In terms of fiscal interventions by governments, a further set of opportunities are **reforms to taxes and subsidies** in order to create a level playing field between producing countries and taking into account environmental externalities. Some of the EU Common Agricultural Policy (CAP) interventions pay farmers for measures that improve biodiversity and ecosystem health, and these may feature in future CAP reforms. There are also instances where subsidies that stimulated unsustainable agricultural production practices have been removed, such as subsidies for pesticides and taxing their over-use or inappropriate

application. Such practices which stimulate fairer competition, free resources and promote environmental protection need to be encouraged.

9. Governments – both at national and regional/local level – also have a role in shaping the agri-food sector's impacts on biodiversity and ecosystems via legislation on **land tenure**. As well as the aforementioned public good issue in the agri-food/biodiversity nexus, a farming enterprise may not take those actions that positively impact on both the private profitability of the farm and on conservation (i.e. 'win-win' outcomes) because the private benefits are realized in the future, and the farmer himself/herself may not benefit. This might occur if the farmer is a tenant farmer or faces uncertainty vis-à-vis future tenure arrangements. This tenure issue affects all investment decisions, those positively impacting on ecosystems and biodiversity being a sub-set. Thus it may be in the best interests of *the farm* to for example adopt agro-ecological practices but not in the interests of *the farmer*.
10. **Intra-government jurisdictions of line ministries** can also be an obstacle against reform towards sustainability in the agri-food sector, and thus finding mechanisms to mitigate this is equally an opportunity, albeit one that it is difficult for a single project alone to influence. For instance, if the agriculture and forestry ministries are separated, each with their independent mandates and targets, then it may be more challenging to insinuate the needs of the agricultural sector vis-à-vis hydrological ecological services (freshwater availability and freshwater quality) into the forestry ministry's afforestation/avoided deforestation strategies. But forest location *does* influence agricultural productivity and so ideally the two ministries would co-develop such land use plans. There are other examples: (i) the development of hydro may be under the purview of energy ministry but choices to divert water bodies/store freshwater will affect the agricultural sector; and (ii) the health ministry might incur the costs of treating farmers suffering from pesticide poisoning, but within government it is primarily choices made in the agriculture ministry that determine the incidence of pesticide poisoning.
11. (1) to (10) above represent some of the main categories of options to explore to find solutions that reduce the impact of the agri-food sector on ecosystems and biodiversity. A cross-cutting theme for all 10 categories is that **direct engagement** with farmers, agri-businesses and their associations, governments and civil society in the sector is a very powerful form of advocacy. In order to be successful, this engagement must not only present *challenges* (e.g. industry's dependency on ecosystem functioning and biodiversity, and the associated risks from habitat loss and degradation) but also identify and in particular promote *solutions* (e.g. tools and methodologies to facilitate actions taken by stakeholders and change agents from private business, such as Natural Capital Protocol sector guides).

Expected Project Results

The main expected results of the project include:

- Enhanced understanding and application of the TEEBAgriFood methodology to the agri-business sector for the countries in scope, and enhanced understanding of the values of biodiversity and ecosystem services to achieve resilient, secure supply from the agri-food sector. A menu of proposed options for changes in the agri-food sector for the countries in scope are assessed under the TEEBAgriFood Framework.

- Recommendations are provided for both land use change and shifts in agricultural production systems and supply chains that have the potential to increase agricultural resilience, reduce supply chain risks for private companies in the sector, improve human health and reduce greenhouse gas production.
- Roadmap of concrete steps to implement a change developed and implemented. This includes the promotion of natural capital and biodiversity accounting applying through the testing and application of the Natural Capital Protocol.

The specific objectives (SOs) of the project are:

- SO.1 Uptake of intervention options by the agri-business community via increased knowledge adoption and inter alia the application of the Natural Capital Protocol, subsequently leading to changes in the dominant business model
- SO.2 Non-business actors (such as civil society, consumers, trade unions, regulators, local and national government etc.) use data and methods generated in the project to influence the sustainability of the agri-business sector.

The TEEBAgriFood Framework will be used to assess the sectors for the countries in scope. The focus in this action is capturing the value of ecosystems services, protecting biodiversity and promoting well-functioning ecosystems the framework, but the scope will include inter alia employment, food security, human health etc. if (and only if) such inclusions ultimately affect biodiversity outcomes in agricultural landscapes. The action aims to be comprehensive, from farm to fork (i.e. across the entire value chain). The TEEBAgriFood Framework allows decision-makers (regulators, agri-business and farmers) to see explicitly any trade-offs that arise through the application of different measures, as compared with Business-As-Usual (BAU).

Work Packages

Project activities are grouped into eight work packages (WPs):

- **WP1.** Country specific analysis on: (i) the types of interventions that have been applied (or alternatively could be applied) to improve biodiversity outcomes in the agri-food sector across the value chain, with a focus on lessons learned; and (ii) for each change agent (government, food processing and distribution agri-businesses, farmers, civil society) determine their respective roles in the change agenda.
- **WP2.** Via desk review and stakeholder consultation, provide a policy mapping for each country in scope, framed with reference to the Driver-Pressure-State-Impact-Response (DPSIR) approach.
- **WP3.** Through the integration of results from WP1 and WP2, and in consultation with the EU and stakeholders in the partner countries, determine and refine the pilot projects to be developed. For each pilot project, there is a need to set out a Business-As-Usual (BAU) scenario as a counterfactual to compare it with Policy-on scenario(s).
- **WP4.** Early engagement with the agri-business community via business network discussions leading to twinning, focusing on the Natural Capital Protocol.

- **WP5.** Scenario analysis of each Business-As-Usual versus Policy-on scenario using the TEEBAgriFood Evaluation Framework. Applying this Framework, determine the constituency of beneficiaries and of losers in comparing the two scenarios. WP6. Using the outcomes of WP4 and WP5, develop a roadmap of concrete steps to implement a change, i.e. which actors and institutions would need to be involved, what actions would need to be taken, and what obstacles would need to be overcome to enact change.
- **WP6.** Using the outcomes of WP4 and WP5, develop a roadmap of concrete steps to implement a change, i.e. which actors and institutions would need to be involved, what actions would need to be taken, and what obstacles would need to be overcome to enact change.
- **WP7.** Deliver the change and ensure project sustainability. The project will support change agents through the provision of training (including media) and technical assistance.
- **WP8.** A cross-cutting work package on Communications and mainstreaming, including website/social media, as well as activities to mainstream natural capital in business assessments via roundtables on the Natural Capital Protocol.

TEEBAgriFood in Africa: assessing options to improve livelihoods

Donor: European Commission

Countries: Brazil, China, India, Indonesia, Malaysia, Mexico, Thailand

Period: April 2019

Project webpage: <http://teebweb.org/agrifood/projects/devco/>

TEEBAgriFood Africa will focus on Sub-Saharan Africa, featuring a regional analysis and narrative on the economics of the agriculture and food sector, particularly in terms of the positive and negative externalities it generates, and the national and international (e.g. 2030 Development Agenda and Sustainable Development Goals) policy context in which these realities exist. It will also showcase key findings from three case studies (described below) and situate them within the regional context. Finally, it will present a theory of change, offering some insights into policy opportunities and recommendations for capturing externalities in decision-making so as to lead to better livelihood outcomes (e.g. sustainability standards and certification, information-provision, market-based schemes, fiscal (dis-)incentives). The Theory of Change must be explicit vis-à-vis the change agents that would need to be involved in each of the four countries in scope.

The following three case studies are being developed in parallel to expand earlier TEEB analyses to better align with the holistic and systems approach of the TEEBAgriFood Framework.

1. Livestock in Tanzania

This study seeks to evaluate the impacts and dependencies along the value chain activities related to three livestock sectors in Tanzania. The aim is to improve decision-making in livestock production policies, to enhance its viability, not just economically but also socially and environmentally. The three different livestock production systems studied are pastoralist cattle systems (Maasai), backyard poultry systems and smallholder dairy systems.

2. Agroforestry in Ghana (cacao) and Ethiopia (coffee)

This study seeks to evaluate the impacts and dependencies along the cocoa and coffee value chains in Ghana and Ethiopia respectively and value the negative and positive impacts to health, ecosystems and the economy of the processes associated with the value chains of the two commodity crops using the TEEBAgriFood Framework. It will also identify opportunities for evidence-based policy support in enhancing national level natural capital accounting and ecosystem services.

3. Rice in Senegal

This study seeks to evaluate the impacts and dependencies along the value chain activities related to rice in Senegal. Specifically, it will test: i) conventional versus agroecological/sustainable rice intensification (SRI) production approaches, and ii) import-oriented rice markets versus domestic consumption.