Food and Agriculture Organization of the United Nations

Response by FAO's Economic and Policy Analysis of Climate Change (EPIC) programme to the Call for Inputs by the Katowice Committee of Experts on the Impacts of the Implementation of Response Measures

Corresponding to Workplan Activity 11: "Facilitate, exchange and share experience and best practices in the assessment of the environmental, social and economic co-benefits of climate change policies and actions informed by the best available science, including the use of existing tools and methodologies"

1. Which climate change policy(ies) and actions, informed by the best available science, were assessed for environmental, social and economic co-benefits and what were the co-benefits identified from your assessment?

The work of the EX-Ante Carbon Balance Tool (EX-ACT) Unit of the Economic and Policy Analysis of Climate Change (EPIC) programme of the FAO Agrifood Economics Division (ESA) focuses strongly on the analysis of co-benefits of climate change policies and actions in agriculture[1]. Specifically, the Unit uses analytical tools and methodologies to understand the synergies and tradeoffs between climate change mitigation, biodiversity impacts, and socio-economic performance of value chain development.

(i) Define the climate change policies and actions, including scope (e.g. local, sectoral, national, international), category (e.g. mitigation, adaptation) and type (e.g. market-based instrument, regulatory instrument, voluntary programme, mitigation strategy, individual action)

The EX-ACT suite is a toolbox of excel-based calculators targeting agricultural investments. The suite is comprised of three complementary tools, which are often applied in conjunction during project and policy design to ensure optimal outcomes of agriculture practices. These tools supports decisions makers in the quantification of greenhouse gases (GHG) released or sequestered from agricultural production (EX-ACT), analysis of activities from agrifood investments along selected agricultural value chains (EX-ACT VC) and assessment of the impact of agricultural activities on local biodiversity (B-INTACT).

- Ex-Ante Carbon-balance Tool | EX-ACT quantifies the amount of GHG released or sequestered from agricultural production. It covers the Agriculture, Forestry and Other Land Use (AFOLU) sector, coastal and inland wetlands, fisheries and aquaculture, agricultural inputs and infrastructure. It can be used at any stage of the intervention – the design, monitoring and evaluation of projects and policies to support informed decision-making processes. It can assess individual projects and policies, but also investment portfolios as well as national level programs and strategies.
- EX-Ante Carbon-balance Tool for value chains | EX-ACT VC analyses the effects of interventions along the agricultural value chains. It supports policy makers in identifying off-farm sources of GHG emissions and farm-to-retail socio-economic benefits when designing projects and policies for low carbon value chains. Furthermore, the tool contains a set of economic indicators to evaluate the profits (wealth accumulation) of the actors operating in the value chain and estimates the number and nature of direct and indirect jobs created along the value chain.
- Biodiversity Integrated Assessment and Computation Tool | B-INTACT looks at the biodiversity impacts of agricultural activities. B-INTACT uniquely seeks to extend the scope of environmental assessments to capture

[1] Agriculture includes the agriculture, forestry and other land use (AFOLU) sector, fisheries and aquaculture, agricultural inputs and infrastructure

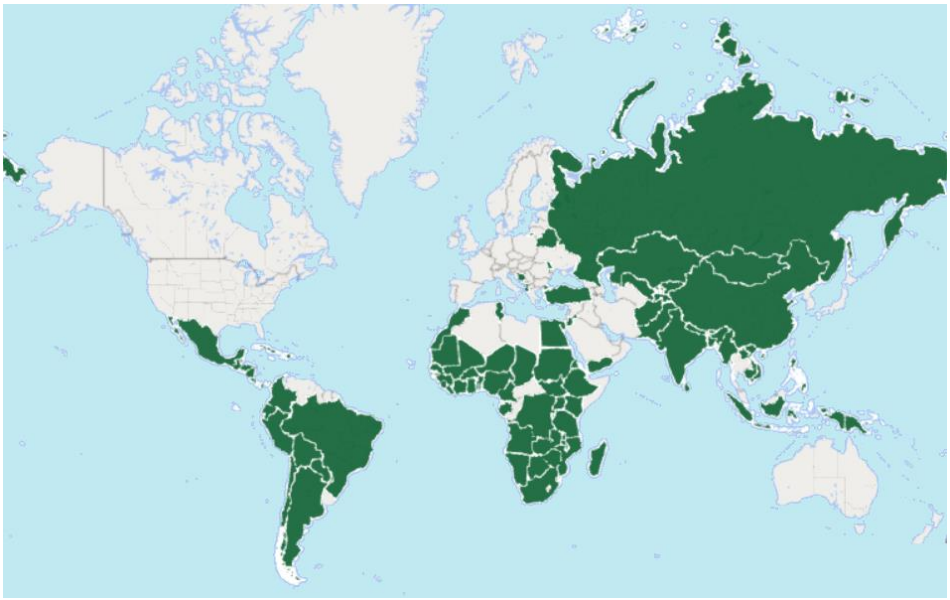
biodiversity concerns, which are not accounted for in conventional carbon pricing. The tool is designed for users ranging from national investment banks, international financial institutions and policy decision-makers, and allows for a thorough biodiversity assessment of project-level activities in the AFOLU sector. It makes use of various geo-referenced maps and tools to increase accuracy and account for the ecological value and biodiversity sensitivity of intervention sites. It can be used at any stage and at any scale of the intervention.

The tools can be used individually or in conjunction. Appraisals can be performed at all scales, from local (ad-hoc assessments of investments at farm-level), to regional (International Funding Institutions investments through development projects) and national (Countrywide appraisal of the Nationally Determined Contribution for the Agriculture, Forestry and Other Land Use sector), and can assess all types of policies involving agriculture directly or indirectly.

The EX-ACT Unit has partnered with several organization, including the Agence Française de Développement (AFD), and the United Nations Framework Convention on Climate Change (UNFCCC); and it is used to analyze projects for many implementing institutions, the World Bank (WB), the International Fund for Agricultural Development (IFAD), the African Development Bank (AfDB), the Global Environment Facility (GEF), and the Green Climate Fund (GCF) etc. More information can be found on the website.

The EX-ACT Unit of the EPIC team has conducted single and/or complementary assessments across more than 90 countries, covering all global developing regions: Africa, Asia-Pacific, Eastern Europe, and Latin America and the Caribbean (figure 1). As a result, the team has gained experience estimating GHG fluxes and co-benefits for all combinations of climate, moisture and soils, applying different emission factors and assumptions. A similar degree of diversity has also been reflected in project activities: the Unit analyzed agricultural activities ranging from land use change to crop production (annual, perennial and rice), from grassland and livestock to forest management, from inputs investments to wetlands, fisheries and aquaculture.

Figure 1: EX-ACT Unit appraisals 'coverage



(ii) Describe what the environmental, social and economic co-benefits of the policies and actions are according to the assessment

The mitigation potentials of climate change policies and actions are generally firstly assessed through EX-ACT. In order to fully take into account the impacts of response measures, complementary assessments are then conducted through EX-ACT VC and B-INTACT. The co-benefits analyzed can be grouped as follows (presented by tool):

- EX-ACT VC

Environmental assessment	Socio-economic analysis	Gender and youth, Sustainable Development Goals (SDGs) tracker
Total emissions (in tCO2 -e) of the entire value chain and of its different stages. – QUANTITATIVE	Prices and quantities of inputs and outputs reported at every stage of an agrifood value chain. – QUANTITATIVE	Gender and youth assessment of the level of participation, including ownership, control and access. - QUANTITATIVE
The carbon footprint of the commodity, in tCO2 -e per unit (tonnes) of product. - QUANTITATIVE	A wide range of indicators including added value, changes in income and employment statistics. - QUANTITATIVE	Progress towards SDG 2 (Zero Hunger); SDG 5 (Gender Equality); SDG 6 (Clean water and sanitation); SDG 9 (Industry, innovation and infrastructure); SDG 12 (Responsible consumption and production). – QUALITATIVE
Water consumption (m3 per tonne of product). – QUANTITATIVE		
Food loss throughout the value chain. – QUANTITATIVE		

- B-INTACT

Environmental assessment
Biodiversity Intactness expressed through the Mean Species Abundance (MSA) metric – QUANTITATIVE
Area of biodiversity loss or avoided biodiversity loss in hectares – QUANTITATIVE
Avoided social cost of Biodiversity in USD – QUANTITATIVE
Impact on Key Biodiversity Areas, Protected Areas, Threatened Species, Alien Species and Water Use – QUALITATIVE

(iii) Specify how the best available science informed the assessment

All tools and related assessments rely on the most up-to-date scientific resources:

- EX-ACT. EX-ACT is primarily based on the Intergovernmental Panel on Climate Change (IPCC) 2019 Refinement to the 2006 Guidelines for National Greenhouse Gas Inventories (IPCC, 2019) and IPCC 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands (IPCC, 2014), complemented by other scientific research. GHG fluxes from farm operations, inputs, transport and irrigation systems implementation are based on Lal (2004). Emission Factors for electricity use are based on United Nation Framework Convention on Climate Change (UNFCCC, 2021), and those for on-farm infrastructure are from Agence De l'Environnement et de la Maitrise de l'Energie (ADEME, 2021). Emission factors for the fishery sector are derived from Parker and Tyedmers (2015), Winther et al. (2009) and Irribaren et al. (2010 and 2011). Soil carbon stock in mangroves is complemented by the review from Atwood et al. (2017).
- EX-ACT VC. The environmental assessment derives methodology from IPCC guidelines (IPCC, 2006, 2019c), GHG protocol (Bhatia et al., 2011, WRI, and WBCSD, 2013), Global Logistics Emissions Council Framework (Greene and Lewis, 2019) and Smart Freight Centre (2019), Institute for Global Environmental Strategies (2020), Agence de la transition écologique (ADEME, 2020) and Breisinger (2012) FAO's Global Food Loss Index (2018). The socio-economic assessment borrows from different strands of economic analysis including micro-economic accounting (crop and enterprise budgets), macro-economic frameworks on national accounts (SNA, 2008), FAO (FAO, 2017, 2019c, 2019d), International Standard Classification of Occupations (ISCO-88) of the International Labour Organization (ILO) (ILO, 2012) and International Energy Agency (IEA, 2020).
- B-INTACT. The quantitative assessment relies on the mean species abundance (MSA) metric, which expresses the mean abundance of original species in disturbed conditions relative to their abundance in an undisturbed habitat. The methodology of the quantitative biodiversity assessment in B-INTACT is based on the Global Biodiversity (GLOBIO) model Version 3.6 developed by the Netherlands Environmental Assessment Agency (PBL), which was built on a set of quantitative relationships that describe six anthropogenic impacts on biodiversity: impacts of land use, climate change, atmospheric nitrogen deposition, disturbance by infrastructure, habitat fragmentation due to land use and infrastructure, and human encroachment. B-INTACT makes use of geo-referenced maps and tools to increase accuracy and account for the ecological value and biodiversity sensitivity of project sites. The tool provides users with a monetary valuation of the avoided biodiversity loss from project activities, based on estimations on the social cost of biodiversity.

2. How such assessment was conducted? Were there any standards used? What are challenges and opportunities, and lessons learnt from these assessments?

(i) The assessment approach (e.g. qualitative and/or quantitative) and (iii) The factors considered in selecting the assessment approach and data collection

The GHGs fluxes arising from policies and actions implemented in the wider agricultural sector are assessed through EX-ACT, while climate co-benefits through the use of EX-ACT VC and B-INTACT. The tools are excel-based, scientifically grounded and freely accessible. They are designed for all users, from national investment banks, international financial institutions to policy decision-makers and local farmers. By fulfilling data requirements specified according to each tool, users receive results according to the indicators identified in the tables above. EX-ACT suite assessments are usually conducted starting from project documentation at the required stage of design, implementation or completion. EX-ACT analysts review documents and isolate the main data required and prepare a first draft assessment of the project. In case of insufficient information, project teams are contacted and channels of communication established to ensure the inclusion of the most updated and realistic information on actual project

activities. Whenever available, location-specific information is used to inform appraisals: each tool provides the possibility to deepen assessments and complement literature-based data with actual data coming from project sites. The opposite is also true: first-hand data from project sites and project management teams is complemented with scientific literature whenever necessary: biomass growth rates, carbon sequestration rates and emission factors are retrieved from available scientific research and contextualized critically according to the geographical and project settings.

(ii) The tools and methods used for the assessment

- EX-ACT adopts a quantitative approach to evaluate projects, policies as well as national level programmes. The results allow the decision makers to ensure that all the interventions contribute to meeting climate change mitigation goals, such as those expressed in the Nationally Determined Contributions (NDCs), while continuing progress towards other environmental and socio-economic objectives, either at regional, national or international levels, for example, climate change adaptation goals expressed in National Adaptation Plans or Sustainable Development Goals.
- EX-ACT VC, uses a quantitative approach to provide support in designing (ex ante) and evaluating (ex post) agrifood VC projects and policies by comparing a "current" scenario with baseline information and a "planned' scenario involving a future vision or goal. Guided by the FAO sustainable food framework (2014), the tool provides a standardized approach for users to measure, analyse, and improve the sustainability of agrifood VCs. The tool was developed with the following specific objectives:
    - to help users "quantify" sustainability performance of agrifood VCs by assessing the environmental, economic, and social dimensions in a consistent and transparent framework;
    - to help users "identify" drivers of sustainability across agrifood VCs through comparing a "current" and "planned' scenario of a project or policy;
    - to help users "determine" entry points for investments and interventions;
    - to help users "evaluate" whether their planned projects and policies meet their objectives; and
    - to support users "design" and develop effective projects and policies to improve sustainability in agrifood VCs.
- B-INTACT takes on a quantitative and qualitative approach. The quantitative approach considers a set of relationships for anthropogenic impacts on biodiversity from land use changes, habitat fragmentation, infrastructure and human encroachment. Biodiversity responses are quantified in the mean species abundance (MSA) metric, which expresses the mean abundance of original species in disturbed conditions relative to their abundance in an undisturbed habitat (where MSA = 1 highlights an entirely intact ecosystem and MSA = 0 highlights a fully destroyed ecosystem). Non-quantifiable impacts to biodiversity from project activities are assessed with a qualitative appraisal of the biodiversity sensitivity, management activities and agrobiodiversity practices, to complement the quantitative assessment.

(iv) The challenges and opportunities in, and lessons learned from, each step in the process

The EX-ACT suite of tools offers the advantage of an integrated mitigation analysis complemented by other socio-economic and biodiversity indicators. As ex-ante analyses heavily rely on predicting future scenarios, the main challenge remains dealing with the uncertainty of future socio-economic and environmental contexts. To increase the likelihood of projects reaching the carbon balance targets set in the ex-ante assessments while generating socio-economic and environmental co-benefits the EX-ACT Unit strictly adheres to the following best practices:

- At the design stage, the ex-ante analysis that sets up the carbon balance targets is developed with a conservative approach in terms of project surface and activities to be implemented. As a consequence, the estimated benefits and co-benefits of projects are also computed with carefulness. Contextualisation of the proposed project is key to understand the geographical, socio-economic and policy characteristics of project location and determine their

influence on achieving the desired outcomes. All related considerations should be duly documented and made available to analysts conducting the assessments.

- Given the uncertainty of the project's enabling environment and its influence on the project's performance, quality monitoring and evaluation system is an integral part of the project's life cycle, including project implementation monitoring and mid-term evaluations. Such progress assessments motivate target and scenario adjustments and advise the project team on the need (or lack of thereof) for complementary actions to achieve the project's objectives.
- Conducting systematic ex-ante, mid-term and ex-post assessments with all three tools allows for comparisons, which are extremely valuable to understanding the drivers of projects' successfulness in reaching their targets and improving future projects design and appraisals alike. The EX-ACT suite of tools can indeed be used for monitoring and ex-post assessments. This allows to constantly monitor the progress towards targets and adjust activities accordingly to ensure that the climate change mitigation outcome, and the related co-benefits are achieved.

In general, constant communication between experts and the project team, as well as continuous monitoring, is ensured and strongly encouraged to improve the quality of information available for the assessments, but also to enable the assessments to support better project design and implementation

3. What actions were/are/will be taken based on the co-benefit assessment and what specific measures taken to maximise the co-benefits if any?

   (i) How the results of the assessment have informed the policymaking process and (ii) How the results of the assessment have incentivized further action to maximize the co-benefits

   The EX-ACT Unit performs assessments on behalf of other institutions. Depending on the requests, assessments have contributed to inform policymaking processes. Among others, the main outcomes of the application of the EX-ACT suite to the agricultural sector include:

   - Support of policy makers in designing the most successful interventions considering (simultaneously) GHG released or sequestered, socio-economic factors and biodiversity outcomes.
   - Support to International Organization in the understanding of potential opportunity costs linked to specific focus on environmental, social or economic goals in the agricultural sector.
   - Support of funding institutions in evaluating and selecting the most promising requests for funding or development projects.
   - Support of national governments in understanding the broader potentials of the agricultural activities listed in their NDCs.

More information can be found on the EX-ACT website: https://www.fao.org/in-action/epic/ex-act-tool/overview/en/

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