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Climate-Smart Agriculture Investment Prioritization Framework

The goal of achieving global food security is facing unprecedented challenges. Population growth and consumption patterns are increasing global food demand. This will require a 70% increase in food production by 2050, even before accounting for attempts to address undernourishment (Bruinsma 2009). Climate change is exacerbating this food security challenge by constraining future capacity to produce food globally. Given that practices of intensification and expansion have contributed to climate change (Foley et al. 2011; Tilman et al. 2011), these also need to be adapted moving forward. Advances towards sustainable development must embrace the inextricable linkages between food security, poverty, and climate change.

What is Climate-Smart Agriculture?

The concept of climate-smart agriculture (CSA) emerged at the first Global Conference on Agriculture, Food Security and Climate Change in 2010 as a response to the above mentioned intertwined global challenges. FAO defines CSA as "agriculture that sustainably increases productivity, enhances resilience, reduces/removes GHGs, and enhances achievement of national food security and development goals" (2010).

Economic development and agricultural expansion are often achieved at the expense of environmentally sustainable practices. CSA promotes increases in productivity, adaptation, and mitigation that encompass socially and environmentally responsible agriculture.

Widespread adoption of CSA can create sustainable landscapes and build momentum towards climate-smart food systems. Achieving this requires integration of CSA across levels, from initiatives on farmer fields to national and regional mobilization.

The CSA concept can guide investment in agriculture research and innovation towards long term solutions that reduce small-holder vulnerability. Scaling up CSA can be done by both increasing adoption of proven practical techniques, such as mulching, intercropping, conservation agriculture, and pasture and manure management, as well as developing innovative practices, such as improved crop varieties, and promoting services such as better weather forecasting and risk insurance.

The ideal combination of CSA actions varies from location to location. For this reason, site specific assessments are critical aspects of CSA implementation, identifying the most suitable actions for each agro-ecological and socio-economic context.

CSA includes both traditional and innovative agricultural practices and technologies that promote agricultural productivity and generate income, while boosting resilience to climate change and mitigate greenhouse gas (GHG) emissions when possible.

Frameworks and tools to direct funding

Accelerating the adoption of CSA techniques in the face of increasing climate change impacts

requires frameworks and tools for stakeholders that guide integration of CSA into policy and planning. These decision-support systems must characterize CSA practices, prioritize locally appropriate actions, assess costs and benefits to identify investment opportunities, and link national and locally planning mechanisms.

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) has supported researchers at CIAT in taking on the challenge of creating a cutting edge CSA prioritization framework that addresses the synergies and tradeoffs between achieving the three goals of CSA (food security, adaptation, and mitigation) along with other stakeholder priorities. The framework is designed for use by international funding institutions and national governments in any region, and can be modified for use by sub-national and regional planners. Community-based adaptation planning approaches that are relevant for use by local stakeholders can also link with this approach as necessary. Development was started in 2013 and initial pilot studies were started in 2014 with ministries in Guatemala and Mali, and five more will be initiated in 2015.

Developing a CSA prioritization framework is a complex process due to the wide range of CSA practices and associated diverse assessment approaches. An extensive database of over a thousand CSA technologies and practices has been created by ICRAF with CCAFS support (CSA Compendium). This will be further developed to include geographic domains and potential benefits, which will feed into the prioritization framework. Clear practical indicators of social, environmental, and economic components of the three pillars of CSA are being used to provide avenues for measuring the effectiveness of CSA activities.

Decision making frameworks on climate change adaptation and mitigation investment often focus on top-down approaches. This framework instead emphasizes the importance of inclusive participation across levels to ensure decisions are aligned with stakeholder desires and contextual realities. To foster broad uptake, this process is detailed in a series of manuals that walk facilitators through the framework and the specific methodologies of each accompanying phase.

Decision makers need frameworks and tools that allow them to identify best-bet CSA investment options and to construct portfolios that help achieve food security, increase farmers' resilience to climate change, and promote the development of a low-emissions agricultural sector.

Creating a framework for prioritizing CSA initiatives: the approach

Through a four phase integrated participatory and analytical process stakeholders screen CSA practices and prioritize portfolios of CSA options that take into account contextualized benefits, constraints, and barriers to adoption. The phases are additive, with each refining the previous outputs. Other processes can be integrated within this approach (e.g. the FAO framework for evaluating sustainable land management). The framework is meant to be tailored to national and local contexts, depending on stakeholders' needs, interests, and interactions around CSA goals. The process is envisaged to take around six months and can be simplified given time, resource, or capacity limitations if necessary and still provide valuable inputs into investment decision making.

Phase 1: ***Preparation–Assessment of practices***
A scoping assessment with the national end users of the CSA portfolios and key experts is conducted to set the objectives of the CSA investment, to identify stakeholders interested in engaging in CSA, and to identify the agro-ecological areas of interest, based on previous

vulnerability analysis etc. The CSA compendium and local expert knowledge is then used to define an initial list of CSA options that have the potential to link with the climate, biophysical, and socio-ecological context and stakeholder preferences. Existing assessments of projected climate change impacts on the agro-ecosystem can assist with refining the CSA list.

Phase 2: *Workshop 1 – option identification*
The first workshop brings together a broader group of stakeholders (national decision makers, researchers, farmer organizations, agriculture technicians, NGOs, private sector etc.) as appropriate for the goals to refine the initial list of CSA options. The group first validates the overall objectives of the process and the focus areas, and then weights the criteria of the three goals of CSA – productivity, adaptation, and mitigation. Allowing for different weightings recognizes that different planning institutions and nations may have different investment priorities. For example, developed countries may be more concerned with emissions reduction than least developed countries.

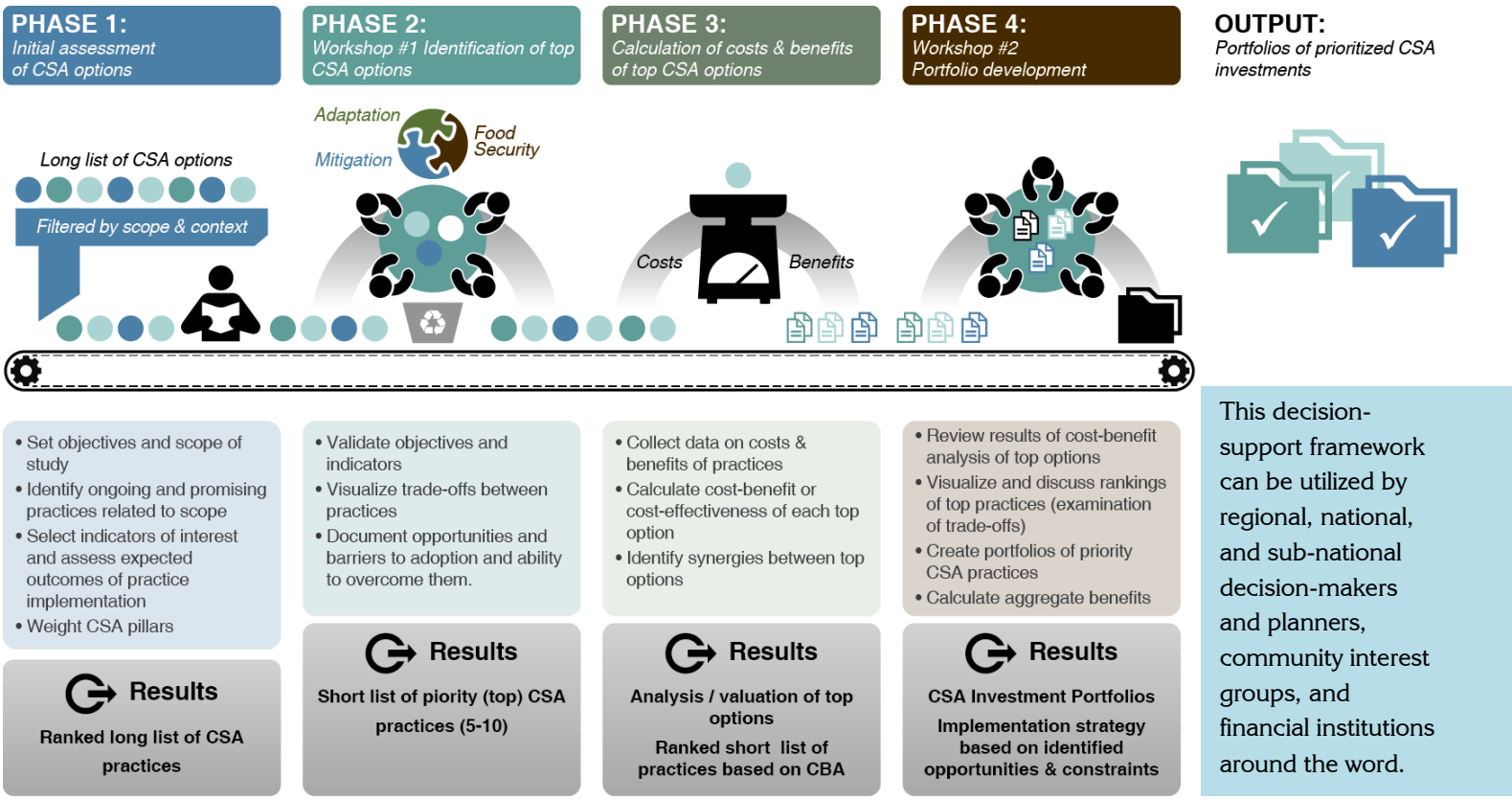
Indicators for each criterion are then selected to measure how different CSA options perform. These indicators should be locally relevant and link with the overall objectives. A suggested list of indicators is provided for stakeholders to use as needed. To ensure a basic likelihood for success of practices, estimates of scalability, feasibility, and beneficiaries will be established along with a brief description of each potential intervention and likely constraints and barriers.

Phase 3: *Cost-benefit analysis (CBA) of available options*
The annotated tailored menu of CSA options, weighted criteria, and indicators are then used as inputs into an economic modeling prioritization tool. The workshop information is supplemented with primary data, scientific literature, and expert knowledge to analyze the costs and benefits of each CSA option and of different portfolios of CSA options over time. The resulting sub-set of CSA options, which were selected by stakeholders for being agro-ecological and socio-economic relevant, can now be ranked based on a cost/benefit or cost-effectiveness analysis of investment.

Phase 4: *Workshop 2 – portfolio analysis and evaluation of barriers*
The final phase reunites stakeholders to review the resulting analysis of costs and benefits of the interventions prioritized in the first workshop. Ratings for the CSA options are visualized to aid discussion of trade-offs between the CSA goals, selected indicators, and the CBA. Aggregate benefits from different portfolios of CSA options can then be explored for final selection of investment priorities.

A critical component of the final workshop is a robust analysis of perceived constraints and barriers to adoption from the perspective of different stakeholder groups. This assessment builds an understanding of social, cultural, and economic barriers to widespread adoption of CSA options. This discussion can modify prioritization and improve design and implementation plans. Portfolios of options and suggested best practices for scaling out CSA are then selected by stakeholders for national, regional, and/or local implementation.

The Prioritization Framework developed by CIAT and CCAFS helps identify existing and promising CSA practices, calculate and analyze the costs and benefits of these practices, and identify possible barriers to adoption of the selected investment portfolios. The framework aims to optimize national and sub-national planning and promote a participatory process for the development of CSA investments.



This decision-support framework can be utilized by regional, national, and sub-national decision-makers and planners, community interest groups, and financial institutions around the word.

Opportunities for national and sub-national planning

The CSA decision-support platform aims to improve national and regional planning by providing a coherent process for directing climate change and agriculture adaptation investments or adjusting policy. With transparency and participation at the heart of this process, local knowledge and scientific evidence unite to establish realistic pathways for increasing CSA adoption. Outputs of the development phase of this project include the decision-support framework, series of manuals, and lessons learned documents from the pilot studies. Each subsequent use of the platform will produce investment portfolios or linked outputs for scaling out CSA, which will both create real action on the ground and provide feedback for improving the platform and establishing best practices.

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