Climate-smart tools for Asia




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The 5Q approach

- Reducing hunger and poverty requires effective strategies but many traditional monitoring and evaluation methods are costly, complicated, rigid, slow, and do not include the opinions of the project beneficiaries.
- The 5Q approach is simple, adaptable, responsive, effective, and better integrates stakeholders.
- Project beneficiaries can proactively participate in programs for greater livelihood, health, and environmental gains.

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Investment outcome

The 5Q approach aims to simplify monitoring, evaluation, and learning (MEL) methods, in order to improve transparency, mutual accountability, and the effectiveness of research and development projects. The fast, easy-to-use, and cost-effective approach offers something that traditional MEL methods don't: project implementers receive quick feedback on their project in order to make adjustments during the project cycle. Project beneficiaries can proactively participate in programs that directly impact their lives, including throughout the project design, implementation, and evaluation processes, in order to have their needs better understood and met.

The challenge

Given the difficulty of reducing poverty and hunger and the plethora of strategies available towards this mission, it is critical to conduct objective and systematic evaluations of interventions, as well as to critically learn lessons gathered. But many traditional monitoring and evaluation methods are expensive, rigid, timely, and often fail to include the most important voice: those of the true stakeholders, like farmers and consumers, who are often geographically and culturally distant from most donor and implementing organizations, hard to reach, and diverse.

The opportunity

The 5Q approach can revolutionize M&E in development, making it responsive and effective, and ensuring mutual accountability and integration of stakeholders in a new way. Donors and implementers can be better connected to the beneficiaries. Research and development projects can be more flexible, adaptable, and impactful.

The strategy

The 5Q approach asks just 5 simple questions at regular intervals to each one of a project's stakeholder groups (e.g., farmers, project implementers, and donors) and rapidly analyzes their answers to assess if the project is on track, and if not, adapt quickly. Answers are collected through a means best suited to each group, such as face-to-face surveys, mobile phone apps, web apps, and participatory video. Responses are automatically stored in a central database, processed, and disseminated through an online dashboard to visualize changes – for example in knowledge, attitude, skills, and practices – throughout the project cycle.

June 2015. Photos: G. Smith/CIAT.

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Scaling climate-smart agriculture practices in value chains

- There are many climate-smart agriculture (CSA) practices that are effective on a local level but that lack mechanisms to take them to scale.
- CIAT goes beyond standard approaches to climate change adaptation by leveraging existing smallholder value chain interventions.
- Scaling-out CSA can help to improve performance along the value chain from input supply, to food production, to post-harvest handling and storage, processing, distribution, marketing and retail, consumption, and disposal patterns of waste.

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Investment outcome

The project seeks to develop incentives and support mechanisms that will drive farmer uptake of CSA practices at scale through value chain mechanisms. CSA practices will be integrated into extension services of voluntary certification schemes and producer organization financing models.

The challenge

The differentiated nature of the risks from climate change requires tailored strategies for managing adaptation. There are many pilots of CSA practices that are effective locally but lack mechanisms allowing for simple replication in other contexts. These pilots therefore remain limited in scope, unable to reach the millions of smallholders that need to adopt CSA practices to remain viable in the face of a changing climate. This impacts not only smallholder livelihoods but also the viability of global supply chains that provide consumers with food and other products, like coffee.

The opportunity

Translating climate science into actionable strategies for farmers and supporting actors opens opportunities to apply lessons learned in pilot projects to climate proof supply chains. This approach adds value to existing work with the goal of achieving large-scale adoption of locally relevant practices that are climate-smart. The potential scope of interventions will be raised to sector level (e.g., the project aims to cover 30% of globally traded cassava and 20% of tea.)

The strategy

The novelty of this work lies in the combination of climate science with voluntary certification and impact investing in a rigorous research for development framework, documentation of results and the facilitation of evidence-based discussions with key value chain actors, governments, multi-lateral lending agencies, banks and private firms about how best to adapt to climate change along an impact gradient. For example, the first pilot project to scale out CSA practices brought together key agents of change of the cocoa and coffee sector in Ghana, Nicaragua, and Peru. By using the knowledge generated in this project, the certification agencies will be able to incorporate CSA practices in their schemes to better prepare the most vulnerable farmers to coming climate change.

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Climate-Smart Agriculture Prioritization Framework

- The Climate-Smart Agriculture Prioritization Framework facilitates governments, donors, and other development partners to establish agricultural investment portfolios that diminish trade-offs between productivity, adaptation, and mitigation outcomes.
- Investors can identify and prioritize CSA practices that have the highest economic, social, and environmental gains in key agricultural regions.
- In-country stakeholders and development partners have the opportunity to better align their CSA investments, given the participatory, expert-based, and flexible character of the prioritization process.

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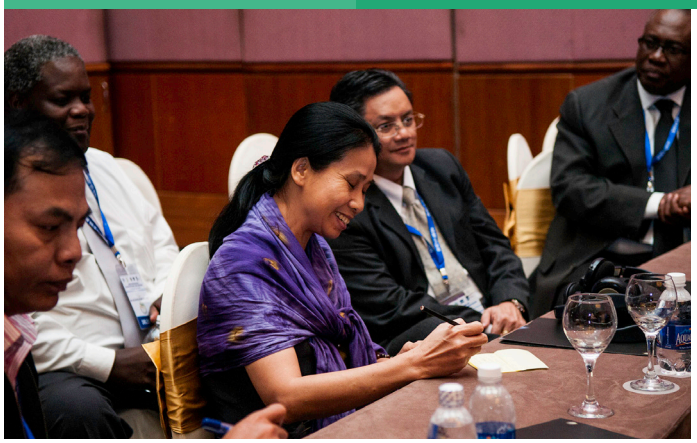

Investment outcome

The Climate-Smart Agriculture Prioritization Framework (CSA-PF) guides stakeholders in optimizing national and sub-national climate change and agricultural planning. CSA investment portfolios are identified based on their potential to sustainably increase productivity, strengthen farmers' resilience, and reduce agriculture's greenhouse gas emissions and increase carbon sequestration as a co-benefit where possible.

The challenge

Climate change is increasingly threatening our food systems yet thankfully many farmers are already adopting CSA practices, such as conservation agriculture techniques (minimum or no-till, mulching, crop rotations), climate-resistant crop varieties, and silvopastoral systems, among others. There is limited data on outcomes of implementing CSA practices and costs and benefits, making it difficult to prioritize practices to invest in. Given these challenges, decision makers, be they farmers, policy makers or donors, struggle to determine what practices to scale out.

The opportunity

An increasing demand for CSA decision-support frameworks has led to the use of the CSA-PF in Colombia, Guatemala, and Mali in 2014 and the scaling out of this approach in 2015 through partnerships with the Alliance for CSA, USAID, CCAFS, and various country partners across Africa & Asia. For national governments, the CSA-PF is an opportunity to align agriculture development and climate change action, promoting a productive, resilient, and low-emissions agricultural sector through increased adoption of CSA. Donors also find CSA-PF useful for identifying entry points for investment.

The strategy

The CSA-PF consists of a series of activities to filter a long list of possible CSA options into a set of best-bet practices and services for an area: (i) linking CSA practices and services to areas of interest and evaluating them based on indicators of the three CSA goals; (ii) economic analyses to quantify costs and benefits of selected practices; and (iii) participatory workshops where stakeholders prioritize existing and promising CSA practices/services linked with specific regions and production systems, while also identifying barriers to adoption. The framework is flexible, meaning the methods, steps, timelines, and costs can be adjusted given the context.

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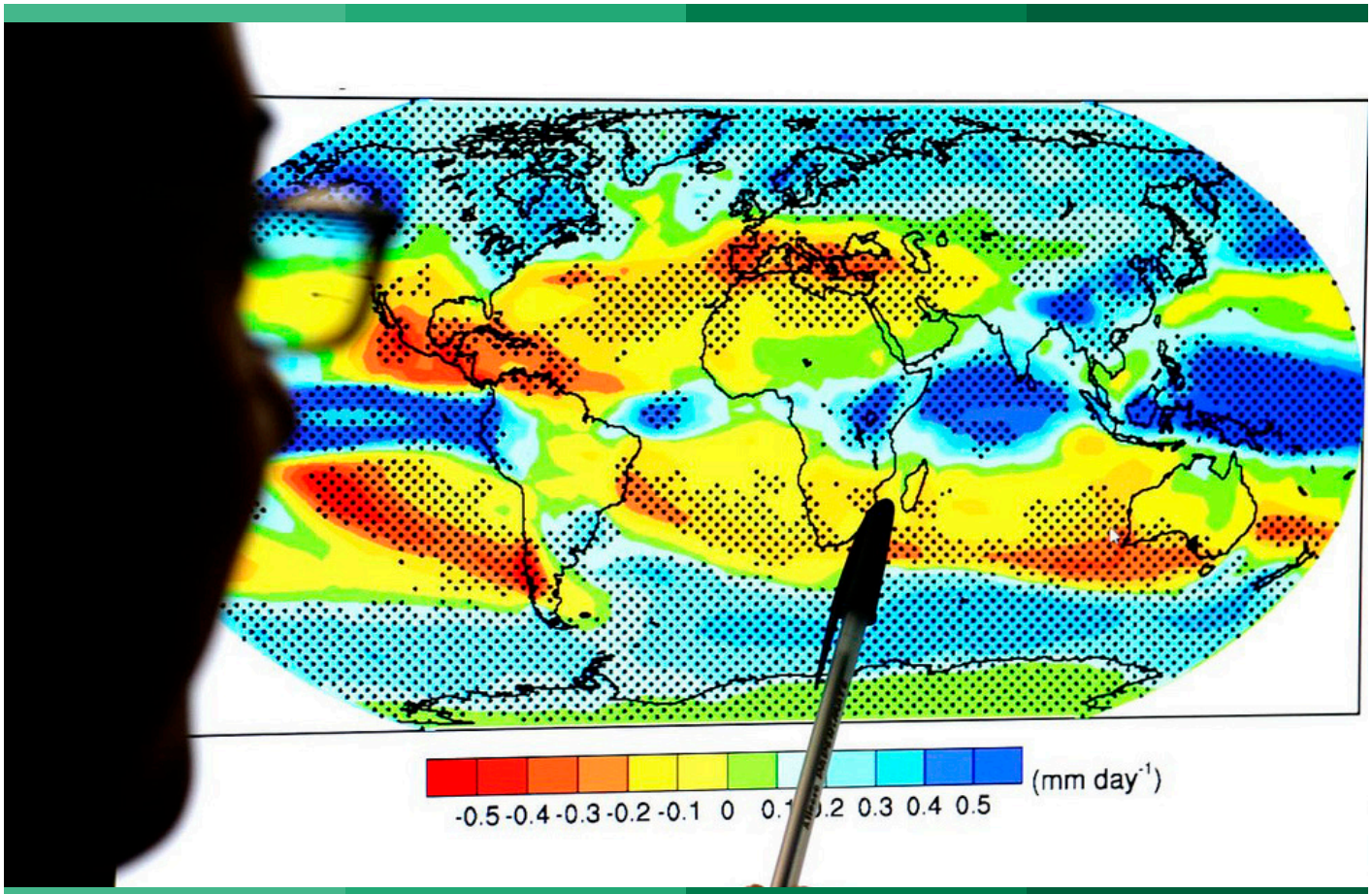

Climate-smart tools for Asia

CCAFS climate portal: Zooming in on climate change data

- If we are to successfully tackle threats to food security, we need more robust climate data that will help us prepare and plan for climate change.
- The CCAFS-Climate Data portal provides users with vigorous, high-resolution climate data that can help assess the impacts of climate change on agriculture.
- The portal is accessible online and the data is easy-to-use, regularly updated, and widely accessed by policy and decision makers, researchers, donors, and NGOs.

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Investment outcome

The CCAFS Climate Portal supports research and development in a variety of fields related to biodiversity and agriculture, particularly crop modelling and agroclimatology. Applications include assessing ecosystem functioning, options for policymaking, and food security and adaptation planning.

The challenge

The agricultural sector will be hit hard by climate change. More than 265 million people are facing a five percent decrease in growing season duration in the next 40 years due to an increasingly variable and hotter climate sweeping across the globe. If we are to successfully tackle threats to food security, we need more robust climate data that will help us prepare and plan for these shifts. Global Circulation Models (GCMs) are one of the few tools researchers currently have to study the effects of climate change in the future. However, their outputs are still too coarse to assess impacts on the environment.

The opportunity

The CCAFS-Climate portal emerges at a time of growing need for high-resolution climate data to assess the impacts of climate change on agriculture. CCAFS-Climate, created in 2008, houses thousands of gigabytes worth of downscaled global datasets for climate change projections that can be used in climate change impact assessments. Downscaling techniques allow researchers to obtain regional rather than global predictions of climatic change. It is useful to produce of precise and accessible assessment tools for conservation planning, niche modeling, crop modeling, and biodiversity monitoring.

The strategy

The portal is accessible online and the data can easily be found via an updated search engine, by specifying method, emissions scenario, period, model, climatological variable, resolution, format, and region. Decision makers and researchers in Asia and around the world have accessed the portal for a wide-range of uses including: to assess the impact of climate change on crop production; to stimulate the impacts of climate change on water use; and to determine strategies to empower female farmers to adapt to climate change.

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Climate-smart tools for Asia

The climate-smart agriculture implementer

- The rapid pace of climate change, and its impact on global food security, means a greater sense of urgency needs to be applied to putting adaption and mitigation measures in place.
- Scientific experts and farmers in Asia face a communication gap which prevents the sustainable scaling out and adoption of climate-smart agricultural technologies and practices.
- The CSA Implementer is a mobile phone application which uses crowdsourcing to bridge the communication gap between farmers and experts with the aim of fast-tracking CSA adoption.

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Investment outcome

CIAT aims to accelerate the rate of adoption of climate-smart agricultural (CSA) practices and technologies in Asia, and to help farmers adapt to and mitigate the effects of climate change. The CSA Implementer combines highly relevant CSA research outputs with practical knowledge on the ground, uses modern information and communication technology (ICT) to support the interaction between actors, and improves the flow of information between scientific experts, implementers, and farmers.

The challenge

The rapid pace of climate change, and its impact on global food security, means a greater sense of urgency needs to be applied to putting adaption and mitigation measures in place. But selecting the ideal combination of CSA practices and getting farmers to adopt them is a complex task. All too often, important stakeholders – like farmers, experts, and implementers – are left out of the CSA practice selection process and lack of communication continues throughout CSA implementation. Farmers have limited access to the information they need about specific farming practices and local conditions. Climate scientists and agricultural experts with the know-how on CSA are disconnected from the farmers and implementers on-the-ground and, as a consequence, may not take into account the local socio-ecological conditions.

The opportunity

Information and communication technologies (ICT) are valuable tools to support the implementation process of CSA practices by improving communication. They can build a bridge between experts and farmers, as well as donors, and project implementers – stimulating discussions between different actors. ICTs are also well-suited for simple project monitoring and evaluation.

The strategy

The CSA Implementer platform is a crowdsourcing tool used to collect and share relevant data for monitoring and scaling out promising climate-smart agricultural practices. A mobile phone application supports knowledge exchange. For example, farmers can ask extension workers questions and be connected to national and international CSA experts. Lessons learned, spatial observations, and issues can be documented by local experts and attended to by experts through the interactive platform. Best practices of CSA implementation are spatially documented and can be out scaled to other similar regions.

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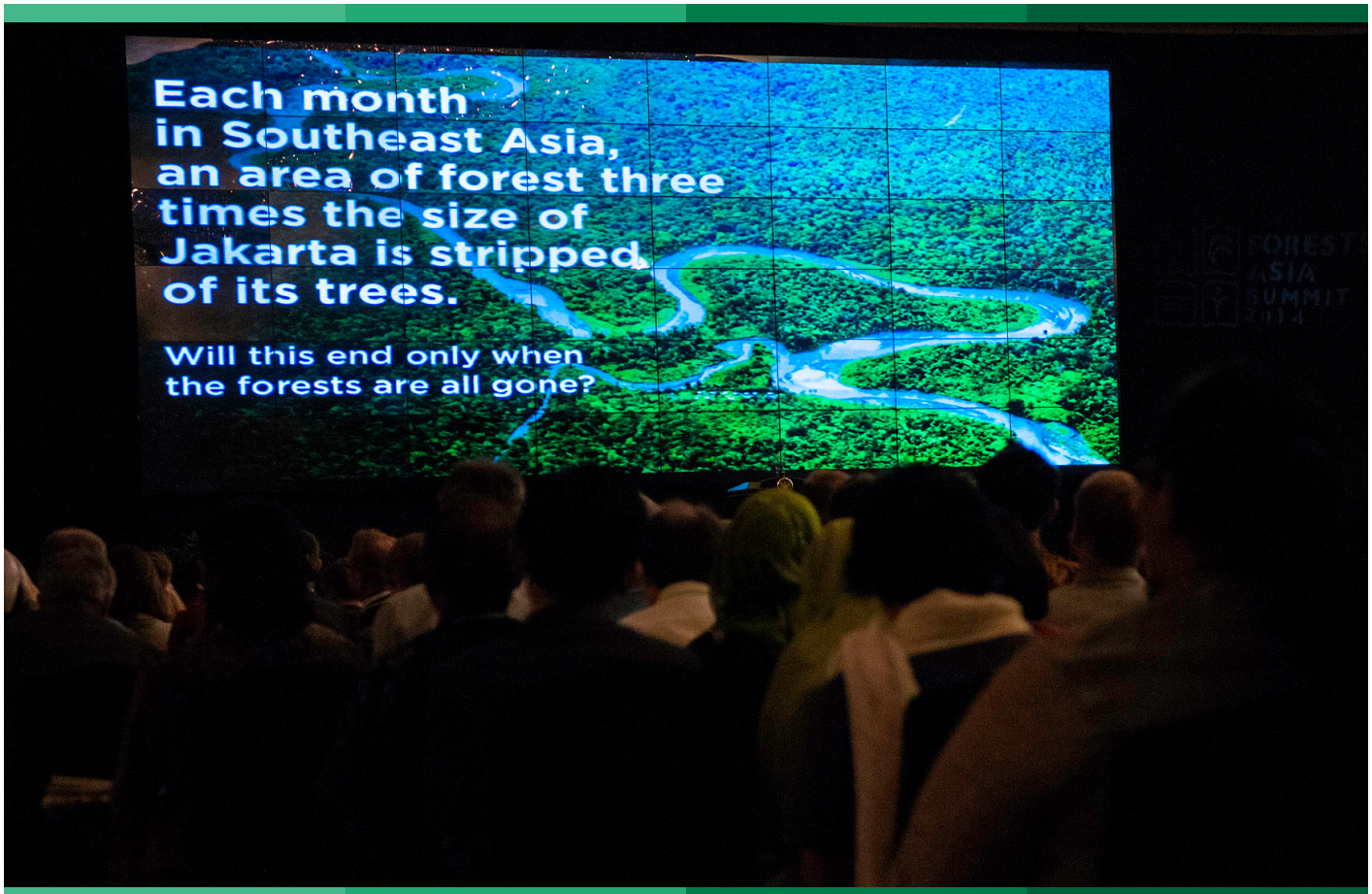

Climate-smart tools for Asia

Terra-i: An eye on habitat change

- Deforestation can lead to widespread loss of biodiversity and also impacts the ecosystem services that foster a stable climate and secure freshwater supplies.
- In many parts of the world the scale and pattern of deforestation is infrequently and inconsistently monitored and this makes management of land-cover change very difficult.
- Terra-i – available open source and free-of-charge – detects land-cover changes resulting from human activities in near real-time, producing updates every 16 days.

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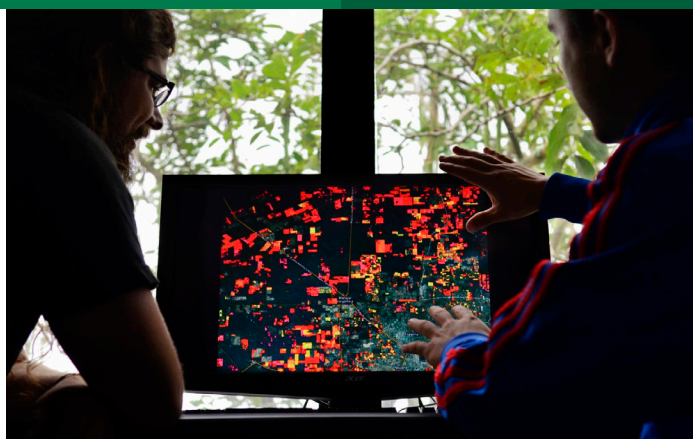

Investment outcome

The aim of Terra-i is to detect vegetation loss resulting from human activities in near real-time and thus provide updated information about vegetation status with a frequency and spatial resolution relevant for decision makers. National and local authorities will have better information to monitor vegetation loss in near real time and respond to new deforestation hotspots accordingly.

The challenge

Natural vegetation conversion is contributing to widespread loss of biodiversity and other critical ecosystem services, yet in many parts of the world the scale and pattern of loss occurs unmonitored. Decision makers – from the local to national to regional level – require easy-to-digest information tools, which are accurate and up-to-date as possible, and friendly assistance in their application in order to effectively halt deforestation. The high temporal resolution MODIS data can be used to monitor land-cover change across large areas but the massive quantity of data and "noise" make this endeavor a challenge.

The opportunity

Terra-i currently detects land-cover changes for the whole of Latin America and is being expanded to cover the entire tropics. Open source and free-of-charge, Terra-i means lower-income countries have the chance to monitor deforestation themselves. Terra-i has attracted over 2,000 registered users, and in just the last year, 260 organizations from 45 countries have reported using the tool for uses as diverse as implementing REDD+ projects to analyzing the complex ties between drug trafficking and accelerated deforestation.

The strategy

Based on satellite information from NASA, Terra-i is smart enough to distinguish between natural losses and those caused by human activity – and can also monitor habitat change in non-forested areas, such as savannahs and deserts. The cost-effective system is based on the premise that natural vegetation follows a predictable pattern of changes in greenness from one date to the next brought about by site-specific land and climatic conditions over the same period. A computational neural network is 'trained' to understand the normal pattern of changes in vegetation greenness in relation to terrain and rainfall for a site and then marks areas as changed where the greenness suddenly changes well beyond these normal limits. This analysis is refreshed with new imagery every 16 days and for every 250m square of land.

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Climate-smart tools for Asia

Tailored climate services for smallholder farmers

- Increasingly erratic climate variability is making it difficult for farmers to adapt to changes in weather and climatic conditions.
- Climate information reduces uncertainty and can help farmers make better use of new seeds and technologies to support complex and context-specific decisions about farm labor and resource allocation.
- Tailored climate services, which bring in new information to complement and extend farmers' knowledge, can reduce climate uncertainty to empower smallholders to benefit from agricultural activities.

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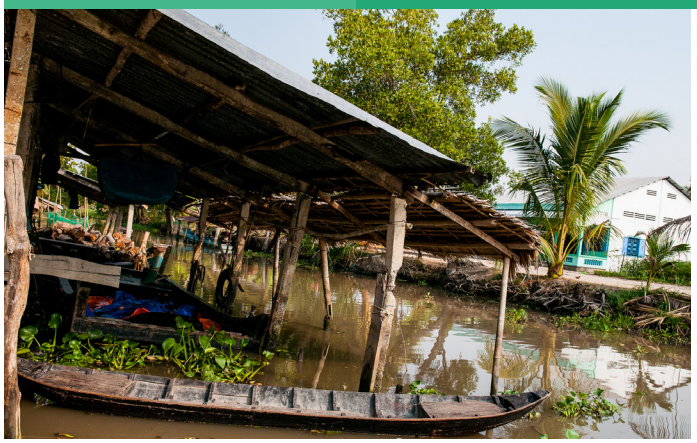

Investment outcome

CIAT aims to better support both small-scale farmers, and the institutions that serve them, with climate information services that are accessible, equitable and integrated with agricultural advisory services and input markets. Under-resourced national meteorological services will be able to supply locally relevant climate data tailored to farmers' needs over large areas.

The challenge

A recent CCAFS workshop – which brought together more than 100 experts from 30 countries and roughly 50 institutions – found that one of the main challenges to farmers benefitting from climate services is salience or tailoring content, scale, format and lead time to farm-level decision making. Other obstacles include access, legitmacy, equity, and integration into larger packages of agricultural support.

The opportunity

Knowledge, sourced from both farmers and the science that supports them, is the backbone of climate-smart agriculture. New climate information tools which include historical analyses, monitoring systems, and agro-climatic forecasts have the power to help farmers adapt to the impacts of climate variability and change. By delivering targeted weather and market information directly to smallholder farmers, those farmers are better equipped to both protect themselves against extreme weather events and to take advantage of good conditions.

The strategy

We focus on the areas that national meteorological services – whose main purpose is to provide high quality climate and weather information – may not have the capacity to deliver alone, such as salience, access, and equity. To address these challenges, our scientists offer a comprehensive set of methods, technologies, and knowledge for improved climate information services including up-to-date agro-climatic information tailored for specific users, historical data, satellite imagery, household surveys and food security indicator measurements, pest and disease monitoring and crop protection using weather-based warning models, and innovative dissemination mechanisms.

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Climate-smart tools for Asia

Climate analogues: Finding tomorrow's agriculture today

- It is difficult to visualize the future impacts of climate change, let alone move to adapt to these changes with confidence.
- Climate Analogues is used to identify areas that experience statistically similar climatic conditions, but which may be separated temporally and/or spatially. In essence, the approach allows you to glimpse into the future by locating areas whose climate today is similar to the projected future climate of a place of interest (e.g., where can we find today the future climate of Hanoi, Vietnam?), or vice-versa.

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Investment outcome

The Climate Analogues approach is able to transform climate projections into field-based realities by identifying sites around the world that already experience your future predicted climatic conditions. This provides a tangible insight into the effects of climate change on agricultural communities and facilitates long-term agronomic planning and mitigation strategies.

The challenge

Climate conditions are changing rapidly and this trend will likely continue and even accelerate. Some regions may benefit from more favorable climate conditions to production (the few winners), while others (the larger group of losers) will face increased climate change impacts. Where conditions improve, the traditional farming systems will be challenged to exploit the additional production potential, and where conditions deteriorate, accelerated adaptation will be vital. It is difficult to visualize the future impacts of climate change, let alone move to adapt to these changes with confidence.

The opportunity

Climate change will significantly alter growing conditions, but in most places the future farming environment will closely resemble conditions that already exist in other parts of the world. Climate Analogues is an effort bring together farmers and extension agents of geographically distant places but analogue conditions so as to facilitate climate change adaptation. For instance, the farmer exchanges promoted by the Farms of the Future project, where the Climate Analogues methodology was used, enabled farmers to gather specific adaptation knowledge that they would otherwise had difficulty in acquiring.

The strategy

Climate Analogues support climate and crop models with on-the-ground empirical testing. The tool connects sites with statistically similar climates, across space (i.e. between locations) and/or time (i.e. with past or future climates). Users may select default criteria or choose from global climate models (GCMs), scenarios, and input data. Once similar sites are identified, information gathered from local field studies or databases can be used and compared to provide data for further studies, propose high-potential adaptation pathways, facilitate farmer-to-farmer knowledge exchange, validate computational models, test new technologies and/or techniques, or enable us to learn from history. Users may manipulate the tool in the free, open-source R software, or access a simplified user-friendly version online.

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Climate-Smart Agriculture Plan: A guide to scaling CSA

- CSA-Plan is a guide for CSA planning, programming and implementation. Sitting within each component of CSA-Plan are information, tools, and approaches to enable action.
- Engagement and capacity building are key crosscutting elements of CSA-Plan.
- CSA-Plan can be applied across levels of decision making. It allows for exchange of information between levels to maximize alignment and integration of information and planning.

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Investment outcome

The CSA-Plan approach frames the steps that are needed to establish and implement a CSA program or initiative in a simple and understandable way for decision makers. The framework can apply across different levels of decision making and can be modified based on user needs. Existing analyses and planning tools can link into the CSA-Plan approach to ensure it is relevant for use in multiple contexts and planning cycles.

The challenge

Large scale systematic investment is needed for CSA to be scaled out to establish transformational change within agriculture systems. To channel funding, programs, policies, and initiatives are needed that identify entry points for mainstreaming CSA, while also addressing locally specific challenges. Decision support is needed to identify the components of CSA programs and then effectively implement them and monitor them to ensure intended impact is being established.

The opportunity

CSA-Plan provides a framework that allows users to identify what concrete actions need to be taken and how the tools they are already using can link into CSA planning approaches. Many governments are in the process of integrating CSA into National Agriculture Investment Plans and other agriculture and climate change action plans. Some regional entities are even helping countries develop CSA Country Programs. These actions demonstrate the demand for organized planning approaches around CSA from sub-national to international levels.

The strategy

Actions needed to establish and execute CSA programs are broken down into steps: 1) situation analysis, 2) targeting and prioritizing, 3) program design, and 4) monitoring and evaluation. Information flows linearly from step 1—4, but also between levels within each step. Engagement and capacity development are integrated as core crosscutting components that are part of all steps of the CSA program development and implementation process. The approach can also be iterative, as the M&E stage feeds back into the situation analysis and prioritization as new data on the outcomes that CSA actions create on-the-ground is produced.

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Climate Wizard

- The Climate Wizard enables technical and non-technical audiences alike to access leading climate change information and visualize the impacts anywhere on Earth.
- With Climate Wizard users can: view historic temperature and rainfall maps, view state-of-the-art future predictions of temperature and rainfall, and view and download climate change maps in a few easy steps.
- The website is designed to be integrated within the government or other institutional websites to provide a seamless look and user experience.

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Investment outcome

Developed through collaboration between the Nature Conservancy, the University of Washington, and the University of Southern Mississippi, the Climate Wizard enables technical and non-technical audiences alike to easily and intuitively access leading climate change information and visualize the impacts anywhere on Earth.

The challenge

There is an urgent need for climate change science to inform on-the-ground adaptation planning. There is no shortage of scientific data that has been produced about climate change, but very little of this information is relevant to on-the-ground decision making for a number of reasons including the resolution being too coarse for most risk analysis to represent local climate conditions very well, and climate change information is often focused on temperature and precipitation rather than specific sectoral impacts.

The opportunity

The Climate Wizard program can provide climate analysis services tailored to the needs of specific decision makers and institutions in Asia. Drawing on a wide range of data, this program develops products to support climate risk analysis and resilience/adaptation planning. Moreover, the website is designed to be integrated within the government or other institutional websites to provide a seamless look and user experience.

The strategy

The climate wizard provides metrics on interpreting risks within specific sector or service, such as:

- **Water supply** focused on total precipitation and two measures of dryness and drought conditions.
- **Flood risk** driven by rainfall average, measures of wet day rainfall, and short term maximum rainfall intensities.
- **Human health** focuses on temperature stress (hot and cold) to people: hottest and coldest single day temperature.
- **Energy demand** incorporates heating and cooling demand using heating and cooling degree days.
- **Agro-ecosystem impacts** to climate change incorporates many aspects including total precipitation, dry conditions, extreme hot and cold temperatures, and growing degree days.

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http://climatewizard.ciat.cgiar.org/

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Climate-Smart Agriculture Rapid Appraisal (CSA-RA) Tool

- There is need for scaled-up action in CSA which calls for identifying priorities at multiple temporal and spatial scales.
- The CSA-RA is a simple, powerful, quick, and inexpensive tool that provides comprehensive information for outscaling CSA.
- Applied at farmer, community, and district scales.

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Investment outcome

The Climate-Smart Agriculture Rapid Appraisal (CSA-RA) Tool provides information to guide strategic agricultural investments to donors, and implement and out scale locally appropriate production practices across landscapes.

The challenge

Implementing CSA across landscapes is not a simplified approach. The scale captures a complex matrix of individual farms, biophysical, and socio-economic dynamics, institutional and market capacity, varying local needs and interests, and involves a range of stakeholders (e.g. farmers, local agricultural experts, researchers, donors and policy makers). Design of CSA interventions often overlooks this variability and implementers struggle on best ways to prioritize across the diverse landscapes. Trade-offs for adopting particular CSA technologies are also not taken into consideration.

The opportunity

The CSA-RA tool assesses multiple aspects of the farming system such as land health, agriculture production, agriculture practices, perceptions of climate impacts/risks/challenges on farming systems and rural livelihoods, and identifies context specific CSA outscaling options. It also identifies indicators that are used to understand trade-offs in the adoption of specific CSA practices.

The strategy

The CSA-RA integrates participatory tools with socio-economic indicators and includes workshops with diverse groups of farmers, including men, women, and youth, interviews with local experts, farmer interviews, and farm observations. It uses village resource maps, climate calendars, and historical calendars, cropping calendars and institutional mapping as part of its participatory methods.

June 2015. Photos: G. Smith/CIAT.

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The International Center for Tropical Agriculture (CIAT) – a member of the CGIAR Consortium and leader of the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) – develops technologies, innovative methods, and new knowledge that better enable farmers, especially smallholders, to enhance eco-efficiency in agriculture. **www.ciat.cgiar.org**

Climate-smart tools for Asia

Targeting CSA portfolios: Ex-ante impact assessment and tradeoffs

- Climate-smart agriculture (CSA) promises the triple win: food security, climate change adaptation and mitigation. However, farming systems and agro-ecologies are highly diverse which makes careful targeting of technologies necessary.
- The potential impact of CSA technologies is different across these different systems and farmers face crucial tradeoffs which leads to low adoption of many improved technologies.
- Robust ex-ante impact assessment and tradeoff analysis can help development stakeholders to make better decision on the nature and location of their investments.

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Investment outcome

CSA technologies and portfolios will only be adopted to sustainably improve farmer livelihoods if they contribute to whole farm performance, balancing tradeoffs between multiple impact dimensions including productivity, socio-economics, and environment. Ex-ante impact assessment can provide information to assist stakeholders in prioritizing and targeting of development investments with minimized tradeoffs and maximized potential adoption rates.

The challenge

Crop-livestock systems and agro-ecologies in Asia are highly diverse, and there are no silver bullets to sustainable development. Farmers face tradeoffs between livelihood and environmental impacts of new technologies, which often makes them hesitant to adopt. Careful targeting of CSA technologies is therefore key to ensure highest adoption and impact and therefore return of investment.

The opportunity

CIAT can assist development investors in prioritizing and targeting CSA portfolios from the onset of their involvement with smallholder farmers. A combination of field to farm level models can predict potential impacts of technologies on multiple dimensions of farm performance across the three pillars of CSA – food security, climate change adaptation, and mitigation. With better information on potential impacts, stakeholders such as NGOs and policy makers can take more evidence-based decisions on nature and location of their investments.

The strategy

Our approach to the ex-ante impact assessment and trade-off analysis combines different modeling tools across scales, assessing several indicators across the three CSA pillars. A crop model estimates environmental and crop impacts such as crop yield, soil organic carbon and erosion, while farm level models predict impacts of technologies on profitability, nutrient balances and greenhouse gas emissions. Special attention is paid to livestock-related greenhouse gases since they constitute the bulk of emissions from smallholder farming systems in Asia.

June 2015. Photos: G. Smith/CIAT.

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