



RESEARCH PROGRAM ON
**Climate Change,
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Beyond the climate science: CCAFS downscaled climate data applied by development agencies around the world

May 2014

CCAFS Outcome Case

Unit	CCAFS Theme Leaders
Year	2013
Contacts	Andrew Jarvis; Philip Thornton
Themes	Long term adaptation; Data and tools
Geographic focus	Global
Summary <p>In sub-Saharan Africa and South Asia, the limited availability of climate data and networks for sharing information can serve as a constraint to agricultural research and development. The lack of basic understanding of earth processes needed to detect flaws in climate models and decide how best to combine climate and crop models in research is another constraint. In order to address these constraints, CCAFS reviewed the knowledge on climate data and crop modelling and ways of coupling agriculture–climate predictions. The result was the successful development of CCAFS-Climate, a data portal that has become the place to get free and open-access downscaled climate data useful for understanding the effects of climate change on agriculture. The portal includes the MarkSim GCM tool, which generates plausible daily data for future climates. Since its launch, the CCAFS-Climate portal has become popular among the research community as well as with other stakeholder groups. Almost 1700 institutions from 185 countries have used the portal for a range of purposes, including: studying climate change impacts at the country-level for informing decision makers, government planning, informing crop insurance policy development, and water policy development. The users included around 400 non-research institutions from 60 countries, indicative of the portal’s popularity outside of the research community.</p>	
Key facts <ul style="list-style-type: none">- CCAFS-Climate provides downscaled climate data for understanding the effects of climate change on agriculture.- Downscaled climate data from CCAFS-Climate is being used for a range of different purposes including: studying climate change impacts at the country-level, government planning, informing crop insurance policy development, and water policy development.- Over 400 non-research institutions from 60 countries used downscaled climate data from CCAFS-Climate.	

<p>Lessons: key elements of success</p> <ul style="list-style-type: none"> - Needs-based approach focused on pressing issue of limited availability of downscaled climate data. - Collaboration across CGIAR centres and advanced research institutions.
<p>Further reading</p> <ul style="list-style-type: none"> - CCAFS Climate portal - MarkSim GCM - Hot out of the oven! Fresh data from CCAFS-Climate - New updates to MarkSimGCM weather generator
<p>Related research outputs</p> <p>Ramirez-Villegas, J., Challinor, A.C., Thornton, P.K., & Jarvis, A. (2013). Implications of regional improvement in global climate models for agricultural impacts research. <i>Environmental Research Letters</i>, 8, 024018.</p> <p>Jones, P.G., & Thornton, P.K. (2013). Generating downscaled weather data from a suite of climate models for agricultural modelling applications. <i>Agricultural Systems</i>, 114, 1-5.</p>

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Regional scenarios to guide policies, investments and institutional change

May 2014

CCAFS Outcome Case

Unit	CCAFS Theme Leaders
Year	2013
Contacts	Joost Vervoort; Patti Kristjanson; Philip Thornton
Themes	Future Scenarios; Data and Tools
Geographic focus	Global

Summary

Scenarios are plausible stories about the different ways in which economic development might occur in the future and the role that agriculture may play, developed collectively based on information from participants with different, and sometimes opposing, experiences and views. CCAFS has promoted the scenario approach as a way of bringing these views and interests together to create credible stories of what might happen and what might be done about it. CCAFS regional scenarios are developed from diverse stakeholder knowledge and quantified through agricultural economic and land-use models. To date, over two hundred and forty organizations, representing government departments, regional economic bodies, CSOs and NGOs, farmer organizations, private sector investors, academia and the media have participated in scenario processes in the five CCAFS regions. CCAFS's forward-looking and evidence based scenarios are used by decision-makers to guide policy and investment choices along impact pathways at regional, national and sub-national levels.

By the end of 2013, national and regional stakeholders in all five CCAFS regions were setting up processes which employed CCAFS scenarios to develop adaptation and mitigation policies. Examples include:

- **Vietnam:** Scenarios were used to develop investment proposals for Climate-Smart Agriculture (CSA).
- **Pakistan:** The Pakistan Planning Commission is using scenarios for its review of a 2030 vision for rural development under climate change.
- **ASEAN:** Policy guidance meeting in 2014 to use the CCAFS scenarios for regional policies.
- **ECOWAS:** Organising a close collaboration with CCAFS on policy guidance, a link that was first established through, and focuses heavily on, the West Africa regional scenarios process.

The scenarios approach now enjoys considerable support for its role in improving the policy environment and helping to shape regional and national priorities.

<p>Key facts</p> <ul style="list-style-type: none"> - CCAFS regional scenarios are developed with input from diverse stakeholder groups. - Scenarios are quantified using agricultural economic and land-use models. - Nearly 250 organizations have participated in scenarios development. - Various national, regional, and international organizations are using CCAFS scenarios for policy development and support.
<p>Lessons: key elements of success</p> <ul style="list-style-type: none"> - Focus on regional stakeholders and priority setting processes has ensured suitability of scenarios in specific regional contexts.
<p>Further reading</p> <ul style="list-style-type: none"> - www.ccafs.cgiar.org/scenarios
<p>Related research outputs</p> <p>Chaudhury, M., Vervoort, J., Kristjanson, P., Ericksen, P., & Ainslie, A. (2013). Participatory scenarios as a tool to link science and policy on food security under climate change in East Africa. <i>Regional Environmental Change</i>, 13(2), 389-398. doi: DOI 10.1007/s10113-012-0350-1</p> <p>Kristjanson, P., Harvey, B., Van Epp, M., & Thornton, P. K. (2014). COMMENTARY: Social learning and sustainable development. <i>Nature Climate Change</i>, 4(1), 5-7.</p> <p>Vermeulen, S. J., Challinor, A. J., Thornton, P. K., Campbell, B. M., Eriyagama, N., Vervoort, J. M., Kinyangi, J., Jarvis, A., Läderach, P., Ramirez-Villegas, J., Nicklin, K.J., Hawkins, E., & Smith, D. R. (2013). Addressing uncertainty in adaptation planning for agriculture. <i>Proceedings of the National Academy of Sciences of the United States of America</i>, 110(21), 8357-8362. doi: DOI 10.1073/pnas.1219441110</p> <p>Vervoort, J. M., Thornton, P. K., Kristjanson, P., Förch, W., Ericksen, P. J., Kok, K., Ingram, J.S.I., Herrero, M., Palazzo, A., Helfgott, A. E. (2014). Challenges to scenario-guided adaptive action on food security under climate change. <i>Global Environmental Change</i>.</p> <p>Vervoort JM, Palazzo A, Mason-D'Croz D, Ericksen PJ, Thornton PK, Kristjanson P, Förch W, Herrero M, Havlik P, Jost C, Rowlands H. (2013). The future of food security, environments and livelihoods in Eastern Africa: four socio-economic scenarios. CCAFS Working Paper No. 63. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Available online at: www.ccafs.cgiar.org</p> <p>Vervoort J. 2013. Shared action on food and environments in East Africa. ECI Insights for Policy No. 1. University of Oxford, Oxford. Available online at: http://www.eci.ox.ac.uk/publications/briefings/ECInsightsforPolicy1.pdf</p> <p>Vervoort, J. and P. Ericksen. 2012. No foresight, no food? Regional scenarios for Africa and South Asia. <i>GFAR</i>. Brief No. 03. The Futures of Agriculture: Future Studies. Available online at: http://www.egfar.org/sites/default/files/files/Foresight%20Briefs/Joost_Vervoort_Brief03_Final.pdf</p>

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Use of climate and weather information by various agencies, meteorological institutions, and farmers

May 2014

CCAFS Outcome Case

Unit	CCAFS Theme Leaders
Year	2013
Contacts	Philip Thornton; James Hansen
Themes	Data and tools; Climate Risk Management
Geographic focus	Global
<p>Summary</p> <p>CCAFS scientists and partners have developed participatory tools and approaches that enable organizations, such as national meteorological services, agricultural advisory services and NGOs, to provide information to large numbers of farmers, and support them to interpret and use the information in their agricultural planning. CCAFS research and capacity investment (with USAID, WMO, IRI and University of Reading) has supported the national meteorological services of Ethiopia, Tanzania and Madagascar to produce and deliver new historic and monitored climate information at a scale that is relevant to smallholder farmers, with complete national coverage.</p> <p>CCAFS efforts have to date influenced the policies and activities of organisations responsible for design and delivery of climate information and services in at least 10 countries in Africa, with beneficial impact reaching tens of thousands of farmers. Organizations which have taken up these approaches include the national meteorological services of Tanzania, Ethiopia, Madagascar, Malawi, Lesotho, Senegal and others; the AGRHYMET Regional Center in West Africa; and international organizations including the International Fund for Agricultural Development (IFAD), and the World Meteorological Organization (WMO).</p>	
<p>Key facts</p> <ul style="list-style-type: none"> - Influence on the policies and activities of organisations responsible for design and delivery of climate information and services in at least 10 countries in Africa. - CCAFS scientists and partners have developed approaches, including participatory tools to provide information to large numbers of farmers and support them to interpret and use the information in their farm planning. - CCAFS efforts have enabled national meteorological services to provide new historical and monitored climate information at a scale relevant to farmers. 	

<p>Lessons: key elements of success</p> <ul style="list-style-type: none"> - Showcases the ability to replicate approaches across various countries. - Evidence from CCAFS pilot projects and knowledge synthesis of farmers' climate information needs used effectively in achieving this outcome. - Development of the capacity of national meteorological services to overcome gaps and produce new, high-resolution information.
<p>Further reading</p> <ul style="list-style-type: none"> - How can we reach a million farmers with climate services? - Strengthening availability and use of climate services in Africa - Data and Tools Theme leader technical report 2013 - Climate Risk Management Theme leader technical report 2013
<p>Related research outputs</p> <p>Osbahar, H., Dorward, P., Stern, R., & Cooper, S. (2011). Supporting Agricultural Innovation in Uganda to Respond to Climate Risk: Linking Climate Change and Variability with Farmer Perceptions. <i>Experimental Agriculture</i>, 47(2), 293-316. doi: Doi 10.1017/S0014479710000785</p> <p>Dorward, P. Stern, R. (2012). Developing approaches to support smallholder decision making and planning through the use of: historical climate information; forecasts; and participatory planning methods. Synopsis presented at workshop on Scaling Up Climate Services for Farmers in Africa and South Asia December 10-12, 2012, Saly, Senegal, CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).</p> <p>Muchedzi, H. Van den Ende, P. Dorward, P. Stern, R. Marovanidze, K. Nhongonhema, R. Mupuro, J. Unganai, L. (2012). Mainstreaming climate change adaptation in agricultural extension: A training manual on use of climate information, and vulnerability and capacity assessment, for agricultural extension staff in Zimbabwe. University of Reading and Practical Action.</p> <p>Van den Ende, P. Dorward, P. Muchedzi, K. (2013). Mainstreaming Climate Change Adaptation in Zimbabwe's Agricultural Extension System, Final Project Report. Agritex, University of Reading and Practical Action.</p> <p>Hansen, J.W., Mason, S., Sun, L., Tall, A. (2011). Review of seasonal climate forecasting for agriculture in sub-Saharan Africa. <i>Experimental Agriculture</i> 47:205-240.</p> <p>May, S., Hansen, J., Tall, A. (2013). Workshop Report: Developing a Methodology to Communicate Climate Services for Farmers At Scale. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Copenhagen, Denmark. (Available online at: http://hdl.handle.net/10568/33443)</p> <p>Ndiaye, O., Moussa, A.S., Seck, M., Zougmore, R., Hansen, J. (2013). Communicating seasonal forecasts to farmers in Kaffrine, Senegal for better agricultural management. Case Study prepared for Hunger, Nutrition, Climate Justice 2013, A New Dialogue: Putting People at the Heart of Global Development. Dublin, Ireland: Irish Aid. (Available online at: http://cgspace.cgiar.org/handle/10568/27888)</p> <p>Tall, A., Jay, A., and Hansen, J.W. (2013). Scaling Up Climate Services for Farmers in Africa and South Asia Workshop Report. CCAFS Working Paper no. 40. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Copenhagen, Denmark. (Available online at: http://hdl.handle.net/10568/27833)</p>

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A 10-year US\$50 million programme focused on crop wild relative collection and pre-breeding for climate change adaptation.

May 2014

CCAFS Outcome Case

Center	International Center for Tropical Agriculture (CIAT)
Year	2011
Contact	Peter Läderach
Theme	Long term adaptation
Geographic focus	Global
Summary <p>CCAFS research demonstrated the threats posed to crop wild relatives by climate change and habitat conversion. Analyses showed the very poor conservation status of these gene pools. Based on this work, the Global Crop Diversity Trust made crop wild relative collecting a high priority activity. Thereafter, the Norwegian Government funded the Global Crop Diversity Trust and the Millennium Seed Bank Partnership, Kew, to establish the 10-year USD 50 million 'Adapting agriculture to climate change: collecting, protecting and preparing crop wild relatives' project focused on crop wild relative collection and pre-breeding for climate change adaptation. Strategic planning research for collecting activities was led by CIAT scientists in collaboration with the University of Birmingham. Regular discussions with the Global Crop Diversity Trust were fundamental in the prioritizing and design of the programme. The project aims to collect the wild relatives of 29 key crops, conserve the specimens in gene-banks, and prepare them for use in plant breeding programmes in time to breed new crop varieties adapted to new climates. The project commenced in 2011, and CIAT continues to provide support in defining priorities.</p>	
Key facts <ul style="list-style-type: none">- CCAFS research demonstrated the threats posed to crop wild relatives by climate change and habitat conversion.- Analyses showcased the very poor conservation status of these crop wild relative gene pools.- The 'Adapting agriculture to climate change: collecting, protecting and preparing crop wild relatives' project aims to collect, conserve, and breed with the wild relatives of 29 key crops over a 10 year period in order to enhance food security through climate change adaptation.	
Lessons: key elements of success <ul style="list-style-type: none">- Partnership with a key institution was critical to success, in this particular case with the Global Crop Diversity Trust.	

Further reading

- CIAT 2011 Annual Technical Report To CCAFS
- [Crop Wild Relatives and Climate Change](#)
- [New website puts emphasis on crop wild relatives and climate change](#)
- Project website (www.cwrdiversity.org); including over 60 blog articles published on this and related sites

Related research outputs

- Cadima, X., van Zonneveld, M., Scheldeman, X., Castaneda, N., Patino, F., Beltran, M., & Van Damme, P. (2014). Endemic wild potato (*Solanum* spp.) biodiversity status in Bolivia: Reasons for conservation concerns. *Journal for Nature Conservation*, 22(2), 113-131. doi: DOI 10.1016/j.jnc.2013.09.007
- Castañeda, N.P., Vincent, H.A., Kell, S.P., Eastwood, R.J., Maxted, N. (2012). Chapter 14: Ecogeographic surveys. Collecting plant genetic diversity: technical guidelines- 2011 update. pp. 1-23.
- Dempewolf, H., Eastwood, R. J., Guarino, L., Khoury, C. K., Muller, J. V., & Toll, J. (2014). Adapting Agriculture to Climate Change: A Global Initiative to Collect, Conserve, and Use Crop Wild Relatives. *Agroecology and Sustainable Food Systems*, 38(4), 369-377. doi: Doi 10.1080/21683565.2013.870629
- Gibbs, J. P., Hunter, M. L., & Sterling, E. J. (2008). Climate Envelope Modeling: Inferring the Ranges of Species to Facilitate Biological Exploration, Conservation Planning, and Threat Analysis. *Problem-Solving in Conservation Biology and Wildlife Management*, 244-254.
- Hunter, D., Guarino, L., Khoury, C., Dempewolf, H. (2011). A community divided: lessons from the conservation of crop wild relatives around the world. Appears in: Maxted, N., Dulloo, E., Ford-Lloyd, B., Frese, L., Iriondo, J., (eds.). *Agrobiodiversity Conservation: Securing the diversity of Crop Wild Relatives and Landraces*. CAB International, Wallingford, UK, 392 pp.
- Jarvis, A., Lane, A., & Hijmans, R. J. (2008). The effect of climate change on crop wild relatives. *Agriculture, ecosystems & environment*, 126(1), 13-23.
- Khoury, C. K., Bjorkman, A. D., Dempewolf, H., Ramirez-Villegas, J., Guarino, L., Jarvis, A., Rieseberg, L.H., Struik, P. C. (2014). Increasing homogeneity in global food supplies and the implications for food security. *Proceedings of the National Academy of Sciences of the United States of America*, 111(11), 4001-4006. doi: DOI 10.1073/pnas.1313490111
- Khoury, C. K., Greene, S., Wiersema, J., Maxted, N., Jarvis, A., & Struik, P. C. (2013). An Inventory of Crop Wild Relatives of the United States. *Crop Science*, 53(4), 1496-1508. doi: DOI 10.2135/cropsci2012.10.0585
- Maxted, N., Kell, S., Toledo, Á., Dulloo, E., Heywood, V., Hodgkin, T., Hunter, D., Guarino, L., Jarvis, A., Ford-Lloyd, B. (2010). A global approach to crop wild relative conservation: securing the gene pool for food and agriculture. *Kew Bulletin*, 65(4), 561-576.
- Ramirez-Villegas, J., & Khoury, C. K. (2013). Reconciling approaches to climate change adaptation for Colombian agriculture. *Climatic Change*, 119(3-4), 575-583. doi: DOI 10.1007/s10584-013-0792-6
- van Zonneveld, M., Jarvis, A., Dvorak, W., Lema, G., & Leibling, C. (2009). Climate change impact predictions on *Pinus patula* and *Pinus tecunumanii* populations in Mexico and Central America. *Forest Ecology and Management*, 257(7), 1566-1576.
- Vincent, H., Wiersema, J., Kell, S., Fielder, H., Dobbie, S., Castaneda-Alvarez, N. P., Maxted, N. (2013). A prioritized crop wild relative inventory to help underpin global food security. *Biological Conservation*, 167, 265-275. doi: DOI 10.1016/j.biocon.2013.08.011

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National adaptation policy adopted in Nicaragua and resulting investments in coffee and cocoa sector

May 2014

CCAFS Outcome Case

Center	International Center for Tropical Agriculture (CIAT)
Year	2013
Contact	Peter Läderach
Theme	Long term adaptation
Geographic focus	Latin America

Summary

CIAT's research showed that coffee production is highly sensitive to climate change and that by 2050 coffee growing areas will move approximately 300 meters up the altitudinal gradient and push farmers at lower altitudes out of coffee production, increase pressure on forests and natural resources in higher altitudes and jeopardize the actors along the coffee supply chain. For cocoa the picture is not as dramatic as coffee but shifts in production areas are also likely to happen by 2050. Recognising these impacts, the Nicaraguan Government in their National Adaptation Plan for agriculture prioritized the adaptation of smallholder coffee farmers' livelihoods, and market-based diversification of coffee-based income at the national level. The National Policy led the government of Nicaragua to request IFAD support in developing climate change adaptation actions within in the coffee and cocoa supply chain. IFAD has committed USD 24.12 million to facilitate productive investments and provide technical assistance to improve productivity and increase adaptation capacities to climate change of poor smallholder producers of cacao and coffee in Nicaragua. These efforts will be complemented by the strengthening of relevant public institutions and policies oriented at providing improved climate-proofed inputs to production, improved information systems on weather events, as well as a general strengthening of the public sector to formulate incentive-based public policies for smallholder farmers.

In addition to these investments, private sector investments were also leveraged based on CIAT's research. In 2012, Green Mountain Coffee pledged more than USD 5.3 million in grants to support food security efforts by NGO partners throughout their supply chain, leading to direct benefits to smallholder farmers.

Key facts

- By 2050, coffee growing areas will move approximately 300 meters up the altitudinal gradient and push farmers at lower altitudes out of coffee production.

- Nicaragua's National Adaptation Plan for agriculture prioritises the adaptation of smallholder coffee farmers' livelihoods, and market-based diversification of coffee-based income.
- IFAD has committed USD 24.12 million to facilitate productive investments and provide technical assistance to improve productivity and increase adaptation capacities to climate change of poor smallholder producers of cacao and coffee in Nicaragua.

Lessons: key elements of success

- Effective and long term engagement with Government, NGO, and private sector partners.

Further reading

- [Are there synergies between climate change adaptation and mitigation in coffee production?](#)
- [Arabica's magic skin](#)
- Nicaragua's [National Adaptation Plan for Agriculture](#)

Related research outputs

Baca, M., Läderach, P., Hagggar, J., Schroth, G., & Ovalle, O. (2014). An integrated framework for assessing vulnerability to climate change and developing adaptation strategies for coffee growing families in Mesoamerica. *Plos One*, 9(2), e88463.

Läderach, P., Lundy, M., Jarvis, A., Ramirez, J., Portilla, E. P., Schepp, K., & Eitzinger, A. (2011). Predicted impact of climate change on coffee supply chains *The Economic, Social and Political Elements of Climate Change* (pp. 703-723): Springer.

Läderach, P., Hagggar, J., Lau, C., Eitzinger, A., Ovalle, O., Baca, M., Jarvis, A., & Lundy, M. (2010). Mesoamerican coffee: building a climate change adaptation strategy. *CIAT Policy Brief no. 2*. Centro Internacional de Agricultura Tropical (CIAT), Cali, Colombia.

Schroth, G., Läderach, P., Dempewolf, J., Philpott, S., Hagggar, J., Eakin, H., Castillejos, T., Moreno, J.G., Pinto, L.S., Hernández, R., Eitzinger, A., Ramirez-Villegas, J. (2009). Towards a climate change adaptation strategy for coffee communities and ecosystems in the Sierra Madre de Chiapas, Mexico. *Mitigation and Adaptation Strategies for Global Change*, 14(7), 605-625.

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A community of practice for African researchers and practitioners

May 2014

CCAFS Outcome Case

Center	International Potato Center (CIP)
Year	2013
Contact	Roberto Quiroz
Theme	Long term adaptation
Geographic focus	East Africa; West Africa

Summary

Yield gap analysis is an important tool to estimate the potential crop production increases in a controlled environment. This analysis gives valuable insights into the biophysical requirements to meet food production goals. While yield gap analysis is well documented for cereals, there are significant gaps in such analysis for commodities such as potatoes. Where data is available, it is often location specific and not scalable. The use of simulation models is also limited by difficulties in parameterisation.

In this context, CIP formed a 'community of practice' with breeders and agronomists from 12 African countries to arrive at reliable parameters and thereby yield gap analyses for the region. The community of practice was primarily composed of experts with between 8 and 31 years experience working on the crop, and validated the parameters for the Solanum simulation model developed by CIP. Furthermore, the community of practice also familiarised themselves with the Solanum model, giving inputs for further development of the model. Through these inputs, Solanum is now able to provide expert validated and more accurate yield gap analysis for potatoes in the region, in a user friendly manner. While there is a need to further expand the scope of this work to have a truly scalable dataset, the initial regional analyses show that potato yield gaps are likely to be higher than expected. They even exceed the yields normally obtained by scientists in on-station trials. Yields for the average farmers are currently less than 10 t/ha, whereas there is potential to achieve 50 t/ha. This information will be crucial for regional policy makers in their endeavour to formulate appropriate policies. The community of practice has agreed to work together to widen the scope of their work under the umbrella of an initiative called 'Climate-Smart Potato in Sub-Saharan Africa'.

Key facts

- CIP research indicates that there is high potential to increase potato yield in Sub-Saharan Africa.
- Solanum simulation model provides expert validated and locally relevant yield gap analysis for Sub-Saharan Africa.

<p>Lessons: key elements of success</p> <ul style="list-style-type: none"> - The community of practice provided a valuable platform for participatory development of the Solanum model. This has not only validated the parameters of the model, but also ensured that the model is simple and easy to use, and will ensure higher uptake.
<p>Further reading</p> <ul style="list-style-type: none"> - Simulated potato yield gaps in Sub-Saharan Africa exceed the best on-station trial yields
<p>Related research outputs</p> <p>Quiroz, R., Harahagazwe, D., Condori, B., Barreda, C., de Mendiburu, F., Amele, A., Anthony, D., Atieno, E., Bararyenya, A., Byarugaba, A., Demo, P., Guerrero, J., Kowalski, B., Anthony Kude, D., Lung'aho, C., Mares, V., Mbiri, D., Mulugeta, G., Nasona, B., Ngugi, A., Njeru, J., Ochieng, B., Onditi, J., Parker, M., Randrianaivoarivony, J.M., Schulte-Geldermann, E., Tankou, C.M., Woldegiorgis, G., & Worku, A. (2014). Potato yield gap analysis in SSA through participatory modeling: Optimizing the value of historical breeding trial data. <i>CIP Working Paper</i></p>

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East African Dairy Development program adopts Climate Smart Agriculture

May 2014

CCAFS Outcome Case

Center	World Agroforestry Center (ICRAF)
Year	2013
Contacts	Henry Neufeldt; Lini Wollenberg
Theme	Low emissions agriculture
Geographic focus	East Africa

Summary

Livestock production is responsible for 12% of all anthropogenic greenhouse gas emissions. Managing sustainable intensification of livestock production systems could therefore soon become a key component of climate change mitigation efforts. Heifer International has been awarded additional funding to build on the existing work of the East Africa Dairy Development (EADD) programme that is working to create a robust dairy industry in a region where demand for fresh milk is close to outstripping supply. The World Agroforestry Center (ICRAF) and the International Livestock Research Institute (ILRI) are partners in this programme, helping Heifer work with more than 200,000 farmers to improve dairy production and provide access to markets over the next four years. EADD has now adopted climate smart agriculture as a programme objective, partly based on engagement with CCAFS scientists, and the mounting evidence that better feeding – by using fodder banks, improved pasture species, planted legumes and crop by-products – and manure management can contribute both to reduced greenhouse gas emissions and improved income for farmers. In partnership with the Standard Assessment of Mitigation Potential and Livelihoods in Smallholder Systems (SAMPLES) project, EADD has selected climate smart agriculture interventions in the new phase of the program. Furthermore, in order to address capacity and knowledge gaps in measuring greenhouse gas emissions in smallholder systems, CCAFS scientists are working with the Food and Agriculture Organization of the United Nations (FAO) at an EADD site in Kenya, estimating greenhouse gas emissions and productivity in dairy systems.

Key facts

- Better feeding and manure management can contribute both to GHG reduction and improved income for farmers.
- CCAFS scientists are working towards addressing capacity and knowledge gaps in measuring greenhouse gas emissions in smallholder systems.
- EADD will work with more than 200,000 farmers to improve dairy production and provide access to markets over the next four years.

Lessons: key elements of success <ul style="list-style-type: none"> - Effective partnership among different CGIAR centers, NGOs and international organizations to deliver transformative change to the livelihoods of rural communities. -
Further reading <ul style="list-style-type: none"> - EADD Phase II Fact Sheet - Standard Assessment of Mitigation Potential and Livelihoods in Smallholder Systems (SAMPLES) project - MICCA: Reducing the climate change 'footprint' of the dairy industry
Related research outputs <p>Thornton, P.K., and Herrero, M. 2010. Potential for reduced methane and carbon dioxide emissions from livestock and pasture management in the tropics. <i>Proceedings of the National Academy of Sciences of the United States of America</i>, 107(46), 19667–72. doi:10.1073/pnas.0912890107</p>





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India's new National Agroforestry Policy

May 2014

CCAFS Outcome Case

Center	World Agroforestry Centre (ICRAF)
Year	2013
Contact	Henry Neufeldt
Theme	Long Term Adaptation; Low emissions agriculture
Geographic focus	South Asia

Summary

India became the first nation in the world to adopt a comprehensive agroforestry plan when the President of India launched the National Agroforestry Policy (NAP) at the World Agroforestry Congress in February 2014, an event organized by ICRAF and partners. The policy recognises the potential of agroforestry to reduce poverty, enhance productivity, while also making agricultural landscapes more resilient to the risks of climate change. The comprehensive policy intends to address the increasing demand for timber, food, fuel, fodder, fertiliser and fibre, while at the same time creating employment opportunities and generating income. The policy envisages the development of a National Agroforestry Mission/Board with an initial investment of approximately USD 33 million, to coordinate agroforestry related activities in the country.

ICRAF contributed to the policy development process. In June 2011, ICRAF with key national partners, especially the National Advisory Council (NAC) launched an Agroforestry Policy Initiative (API). Another workshop in 2012 and a series of them in 2013 brought out a framework and significant recommendations, which contributed to the preparation of the draft agroforestry policy. These efforts specifically sought to mainstream climate change and its related aspects, and the policy document highlights the climate change mitigation and adaptation benefits of agroforestry. ICRAF is expected to continue to play a key role in the policy implementation, including through support to the National Agroforestry Mission/Board.

Key facts

- Over 80% of India's farmers are rain fed smallholders with two hectares or less and are vulnerable to the impacts of climate change.
- Agroforestry can increase the resilience of smallholder farmers, while contributing towards poverty reduction and increasing the productivity of smallholder farms.
- Currently 64% of India's timber and almost half of its fuel wood come from trees grown on farms.
- The National Agroforestry Policy will help increase area under agroforestry from 25 million hectares to 53 million hectares.
- National Agroforestry Mission/Board to be set up with an initial investment of around USD 33 million.

Lessons: key elements of success

- Early and ongoing engagement with Governmental and NGO partners.

Further reading

- [National Agroforestry Policy](#)
- [India leads the way with agroforestry policy](#)
- [India's bold plan to achieve 33% tree cover through agroforestry](#)



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RESEARCH PROGRAM ON
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Putting Alternate Wetting and Drying (AWD) on the map, globally and nationally

May 2014

CCAFS Outcome Case

Center	International Rice Research Institute (IRRI)
Year	2011
Contact	Reiner Wassmann
Theme	Low emissions agriculture
Geographic focus	Global

Summary

Working in partnership with national research institutions, IRRI has developed the Alternate Wetting and Drying (AWD) rice management practice. The practice reduces water use by up to 30% and methane emissions by 48% without impacting yield. With efficient nitrogen use and application of organic inputs to dry soil, the practice can reduce emissions even further, enhance nutrient efficiency, and deter insect infestation. AWD has been field tested and validated by rice farmers in Bangladesh, Indonesia, Lao PDR, Philippines, Myanmar, and Vietnam. AWD is now being mainstreamed in extension efforts by formal extension institutes and NGOs in a number of countries in Southeast Asia. Training and extension materials on AWD are also being included in curricula of agricultural colleges, universities and extension certification schemes.

Recognizing the benefits that can be derived when AWD is widely adopted, in 2011, Vietnam's Ministry of Agriculture and Rural Development (MARD) highlighted AWD as one of the improved cultivation techniques for rice production to be adopted by 3.2 million hectares of rice cultivation areas by 2020. With this policy support, the adoption of AWD is being mainstreamed in different programs of MARD. In addition to recognition at the local and national levels, AWD is also gaining international recognition and acceptance. A methodology for methane emission reduction by adjusted water management practice in rice cultivation has been approved by the Clean Development Executive Board, and emissions reduction projects can be developed under this methodology.

Key facts

- AWD reduces water use in rice cultivation by up to 30%, and methane emissions by up to 48%.
- AWD has been field tested and validated by rice farmers in Bangladesh, Indonesia, Lao PDR, Philippines, Myanmar, and Vietnam.
- Vietnam's Ministry of Agriculture and Rural Development (MARD) highlighted AWD as one of the improved cultivation techniques for rice production to be implemented in the country.
- AWD is gaining increased recognition in national and international policy frameworks.

<p>Lessons: key elements of success</p> <ul style="list-style-type: none"> - Field demonstrations showcased AWD's benefits to farmers and policy makers. - The multiple wins which AWD offered farmers by reducing costs associated with watering, fertilizer and insecticide application enabled it to gain higher acceptance.
<p>Further reading</p> <ul style="list-style-type: none"> - Strategies for low-emission cultivation are being explored step-by-step - Addressing water scarcity problems through AWD - CDM Methodology: Methane emission reduction by adjusted water management practice in rice cultivation
<p>Related research outputs</p> <p>Siopongco, J., Wassmann, R., & Sander, B. (2013). Alternate wetting and drying in Philippine rice production: feasibility study for a Clean Development Mechanism.</p> <p>Sander, .BO., Wassmann, R., Siopongco, J.D.L.C., (). Water-saving techniques: potential, adoption and empirical evidence for mitigating greenhouse gas emissions from rice production. In: Hoanh, C.T., Smakhtin, V., Johnston, T. (Eds). Climate change and agricultural water management in developing countries. <i>CABI Climate Change Series</i>. CABI Publishing, UK (in print)</p> <p>Richards, M., Sander, B.O. (2014). Alternate wetting and drying in irrigated rice. CCAFS Info Note. <i>CGIAR Research Program on Climate Change, Agriculture and Food Security (CAAFS)</i>. Copenhagen, Denmark.</p>

Note: This was achieved in combination with the Global Rice Science Partnership (GRiSP)



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Improved rainfall thresholds for index insurance in India

May 2014

CCAFS Outcome Case

Unit	CCAFS South Asia Regional Program
Year	2013
Contact	Pramod Aggarwal
Theme	Climate Risk Management
Geographic focus	South Asia

Summary

Weather shocks can trap farmers and households in poverty. At the same time, the risk of such shocks occurring often discourage farmers from trying out innovations, such as new types of seed or different technologies, which could increase productivity and resilience. Conventional crop insurance relies on the direct assessment of an individual farmer's loss or damage, but carrying out field assessments in developing countries is often time consuming and costly. Weather index insurance, on the other hand, is based on objective thresholds such as rainfall amounts or temperatures measured at defined locations. Based on the requirements of the crop being insured, a threshold is selected above or below which payouts are made. This means it is not necessary to assess every insured farmer's loss. In this way, weather index insurance enables farmers to insure their crops against weather risk in areas where traditional agricultural insurance is not available.

In India, weather index insurance was introduced to farmers in 2003. In 2007, the national government adopted it as an alternative to crop-yield index insurance. By 2012, up to 12 million farmers, growing 40 different crops over 15 million hectares, were insured against weather-related losses. Despite its potential, weather index insurance can fail to benefit farmers if the information available to the insurance company does not reflect the reality in the fields. CCAFS has played a critical role in improving agricultural insurance products to meet the needs of farmers by enriching the information that the Agriculture Insurance Company of India (AIC) uses for weather index insurance. This involved strategic use of spatial weather, soil and crop management data together with regionally validated crop modelling work to identify critical rainfall thresholds for different crop growth stages. These thresholds are now used by the Agricultural Insurance Company of India (AIC) to develop rainfall index insurance schemes for rice and other crops. These schemes led to the protection of more than 50,000 rain-fed farmers from the vagaries of rainfall in one crop season alone, and further expansion is envisaged. As millions of India's farmers increasingly experience the impacts of climate change, this type of insurance will become a lifeline for many of them.

<p>Key facts</p> <ul style="list-style-type: none"> - Weather index insurance enables farmers to insure their crops against weather risk in areas where traditional agricultural insurance is not available. - CCAFS made strategic use of spatial weather, soil and crop management data together with regionally validated crop modelling work to identify critical rainfall thresholds for different crop growth stages. These thresholds are now used by the Agricultural Insurance Company of India (AIC) to develop rainfall index insurance schemes for rice and other crops. - More than 50,000 rain-fed farmers insured against the vagaries of rainfall in one crop season alone.
<p>Lessons: key elements of success</p> <ul style="list-style-type: none"> - Effective engagement with the private sector and efforts to address knowledge needs of the sector, with clear and quantifiable development outcomes.
<p>Further reading</p> <ul style="list-style-type: none"> - Weather index insurance: new age risk management solution in South Asia - Weather index-based insurance: A tool for managing climate risk - Improved rainfall indices help insure more than 50,000 farmers in India - Staying one step ahead of South Asia's climate challenge - Index-based insurance: a pathway out of poverty? - RPL South Asia 2013 technical report
<p>Related research outputs</p> <p>de Nicola, F., Hill, R.V., Carter, M., Choularton, R., Hansen, J., Osgood, D., (2011). Index insurance for managing climate-related agricultural risk: toward a strategic research agenda. <i>Workshop Report</i>. International Food Policy Research Institute (IFPRI). Washington, DC, USA:.</p>

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Scaling up seasonal forecasts to over 2 million users in Senegal

May 2014

CCAFS Outcome Case

Unit	CCAFS West Africa Regional Program
Year	2013
Contact	Robert Zougmore
Theme	Climate Risk Management
Geographic focus	West Africa

Summary

With CCAFS support, vital seasonal rainfall forecasts are reaching around two million people across Senegal, helping smallholder farmers make better-informed decisions about agricultural management in a changing climate.

CCAFS scientists worked with the national meteorological agency, Agence Nationale de l'Aviation Civile et de la Météorologie (ANACIM) to develop more accurate and specific seasonal rainfall forecasts, and to raise capacity of partners to do longer-term analysis and provide more targeted information for farmers. The forecast information provided includes the total rainfall, the onset and end of the rainy season, plus a 10 day forecast across the rainy season. The information is conveyed to farmers as agro-meteorological advisories that are tailored to meet their local needs. These advisories enable farmers to take crucial agricultural management decisions in the context of climate variability. While this approach has been piloted in the Kaffrine region since 2011, the geographical scope has now been widened through a partnership with the Union des Radios Associatives et Communautaires du Sénégal (URAC), an association of 73 community-based radio stations promoting economic development through communication and local information exchange. The union's reach extends across all of Senegal's 14 administrative regions and it operates in all local languages, giving it significant potential to transform lives through reliable information. Downscaled seasonal forecasts and 10 day forecasts across the rainy season are now transmitted as a special radio program in the four administrative regions of Kaffrine, Thies, Diourbel and Louga. The interactive nature of the radio program allows listeners to revert with their feedback including additional information, views, and requests of clarification.

Key facts

- Vital seasonal rainfall forecasts are reaching around two million people across Senegal.
- CCAFS scientists worked with the national meteorological agency to develop more accurate and specific seasonal rainfall forecasts.
- Downscaled forecasts are transmitted through a special radio program in a partnership with an association of community-based radio stations.

<p>Lessons: key elements of success</p> <ul style="list-style-type: none"> - Emphasis on communications and engagement through community-based radio stations. - Tailoring information to address local needs and priorities. - Partnerships with Agence Nationale de l'Aviation Civile et de la Météorologie (ANACIM) and Union des Radios Associatives et Communautaires du Sénégal (URAC).
<p>Further reading</p> <ul style="list-style-type: none"> - In Senegal, farmers use forecasts to combat climate risks - 2013 CCAFS Report to CGIAR Consortium - 2013 RPL West Africa Technical Report - Communicating the probabilistic seasonal forecast for a better farming management and decisions
<p>Related Research Outputs</p> <p>Jarvis A, Lane A, Hijmans RJ. 2008. The effect of climate change on crop wild relatives. <i>Agriculture Ecosystems & Environment</i>, 126(1-2), 13-23. doi: DOI 10.1016/j.agee,2008.01.013</p> <p>Ndiaye, O., Moussa, A., Seck, M., Zougmore, R., & Hansen, J. 2013. Communicating seasonal forecasts to farmers in Kaffrine, Senegal for better agricultural management.</p> <p>Ndiaye, O., Zougmore, R., Hansen, J., Diongue, A., Seck, E.M. 2012. Using probabilistic seasonal forecasting to improve farmers' decision in Kaffrine, Senegal. <i>Risk Management-Current Issues and Challenges</i>, 497-504, 21. doi: 10.5772/2568 .</p>

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