



New Book: Climate Prediction for Agriculture – Advances and Challenges

In vast parts of the world, agriculture is solely rainfed. Failure of rains and occurrence of natural disasters such as floods and droughts could lead to crop failures, food insecurity, famine, loss of property and life, mass migration, and negative national economic growth. Agricultural communities around the world have always looked for ways and means to cope with climate variability including the use of various traditional indicators to predict the seasonal climate behaviour.

However, in an age of such certainty that climate change is happening, there are few more important issues than that of how we feed ourselves. It is estimated that hunger is currently affecting one out of every seven people on planet Earth. Projections show that unless the world community is prepared to undertake intensive and sustained remedial action over a long-term, there could still be almost 700 million people chronically undernourished by the year 2010, with over 300 million in sub-Saharan Africa alone. Agriculture and its associated industries are primary sources of food and a major employment sector in most developing countries.

Climate change, and increasing climate variability, as well as other global environmental issues such as land degradation, loss of biological diversity and stratospheric ozone depletion, threaten our ability to meet the basic human needs in adequate food, water and energy, safe shelter and a healthy environment. Decreasing the vulnerability of agriculture to natural climate variability through a more informed choice of policies, practices and technologies will, in many cases, reduce its long-term vulnerability to climate change.

Increasing climate knowledge and improved

prediction capabilities facilitate the development of relevant climate information and prediction products for applications in agriculture to reduce the negative impacts due to climate variations and to enhance planning activities based on the developing capacity of climate science. In order to review our present knowledge in the field of seasonal to interannual climate predictions and their applications to agriculture, the World Meteorological Organization (WMO), the Global Change System for Analysis, Research and Training (START) and the International Research Institute for Climate and Society (IRI) organized an International Workshop on Climate Prediction and Agriculture – Advances and Challenges from 11-13 May 2005 in Geneva, Switzerland. The main objective of this workshop was to review advances in the application of seasonal climate prediction in agriculture over the past 5 years, and identify challenges to be addressed in the next 5-10 years to further enhance operational use of climate prediction in agriculture in developing countries.



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Photo: World Bank.

A selection of science articles prepared for this workshop was recently published as a book. *Climate Prediction and Agriculture: Advances and Challenges*, edited by Drs Mannava

Sivakumar and James Hansen, shall serve as a major source of information to all services, agencies and organizations at national, regional and global level involved in promoting operational applications of climate predictions in agriculture.

The book includes case studies from almost all parts of the world where weather and climate forecasts were translated into the decision making process in the agricultural sector. A study conducted in Isabela Province (Philippines) investigated the differences in income generated from crop planted on dates based on climate models as compared to crop planted by farmer's choice according to traditional knowledge. Another study from the Maipo River Basin (Chile) examined the potential use of climate forecasts for irrigation management considering resource allocation and risk policy. A third study from Sudano-Sahelian West Africa analysed adaptation as a powerful strategy for managing the variability of climate and also considered the exploitation of improved breeding and crop-yield programmes.

Further, the book encompasses chapters that summarize the development of a combined crop and climate forecasting system for seasonal to decadal predictions; an assessment on the added value using regional climate models obtained through downscaling of global models; and a discussion on the challenges to face when delivering the climate forecast products to farmers.

Various pathways leading to institutionalizing climate forecast applications for agriculture through efforts such as the Regional Climate Outlook Forums (RCOFs) in Africa and the Consultative Group on International Agricultural Research (CGIAR) are also presented.

The final chapter summarizes conclusions and recommendations made at the Workshop. There was general consensus that over the past decade great advances were made enhancing our knowledge of climate prediction applications in agriculture. However, end users of climate predictions encounter difficulties in understanding the terminology and formats

that climate institutions use to delivering forecast and other information, especially the nature of uncertainty. It became clear, that there are limited curriculum resources and training opportunities on the applications of weather and climate (forecast) information at all levels, including policy makers and applied researchers.

Workshop participants saw a great need in improving the scientific basis for climate/ weather forecast development linking to agriculture (through e.g. crop models; optimum planting window predictions etc). High priority areas identified by Workshop participants include capacity building, network development and institutional partnerships including Climate Outlook Forums. It was also recommended to develop a common language for the dialogue between climate information producers and end-users, and to streamline communication systems for delivery of climate information to end-users.

Facing sustainable agriculture development, the WMO gives priority to the timely and effective implementation of some of the activities of its World Climate Programme, in particular the Agricultural Meteorology Programme (AgMP) and the Climate Information and Prediction Services (CLIPS) project, to ensure that progress made in the seasonal to interannual climate prediction is translated into field applications to ensure food security. In this regard, the Commission for Agricultural Meteorology (CAgM) of WMO has recommended that weather and climate forecasts should be increasingly tailored towards the requirements of agriculture in order that farmers can make their decisions with greater confidence.

Climate experts associated with the WMO co-sponsored World Climate Research Programme (WCRP) have significantly contributed to the advances made in several areas especially in the science of climate forecasting, downscaling large area climate forecasts to local applications, integration of climate forecasts in operational crop models to develop alternative scenarios for operational decision making, and capacity building at the local level in all these areas.

The climate forecast community is now capable of providing an end-to-end multi-scale (in space and time) integrated prediction system that provides skilful, useful predictions of variables with socio-economic interest. For agriculture, climate forecasts must be interpreted in terms of production outcomes at the scale of decisions if farmers and other agricultural decision-makers are to benefit. Indeed, there have been several successful attempts to link seasonal climate forecasts from general circulation models with crop models.

Currently, there is a disconnection between the climate information enterprise (e.g. modelling, forecast production, design, user-assessments, user needs and constraints to the uptake of forecast products) and the linkages and interplay with those operating in formal institutions (e.g. departments of agriculture, water affairs etc.) as well as informal institutions (e.g. welfare organizations, humanitarian organizations etc). Hence, greater attention needs to be given to what infrastructural and institutional advances are necessary to facilitate the use of forecast information within the livelihood strategies prevailing in a given region.

Food security is a global issue. To provide a fundamental basis for the dialogue among stakeholders the book presented here resembles a comprehensive compendium on advances and success stories in the field of climate predictions in agriculture and outlines gaps to fill and challenges to face. *[c arndt]*

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References and links

Mannava V. K. Sivakumar & James Hansen (eds.) Climate Prediction and Agriculture: Advances and Challenges (2007) Springer. ISBN-10 3-540-44649-4.

