

Climate risks as change factor in agricultural education

J.G. Timmerman¹, R. Giordano², A. Kamal³, N. Lamaddalena⁴, C. J. Perez⁵, L.A. Simpson⁶, N. Thi Yen⁷, S.D. Villanueva⁸, R. Wijaya⁹, S.K. Yadav¹⁰, P. van der Keur¹¹, E. Callairi¹², F. Jaspers¹

¹ Alterra Wageningen UR, P.O. Box 47, 6700 AA Wageningen, Netherlands

² National Research Council (CNR)- Water Research Institute (IRSA), Via De Blasio, 5 - 70132 Bari, Italy

³ UST (Unnayan Shahojogy Team), House: 738, Road: 09, Baitul Aman Housing Society, Adabor, Dhaka 1207, Bangladesh

⁴ CIHEAM – IAM Bari Institute, Via Ceglie 9, 70010 Valenzano, Bari, Italy

⁵ United Nations Development Programme Nicaragua, Apartado 3260 / Managua, Nicaragua

⁶ Caribbean Agricultural Research and Development Institute (CARDI), University of the West Indies, University Campus, St. Augustine, Trinidad and Tobago.

⁷ Care International in Viet Nam, 92 To Ngoc Van, Tay Ho, Ha Noi, Viet Nam

⁸ Alternate Forum for Research in Mindanao, Inc. (AFRIM), Door 7, Six Angels Building, Camia corner Jasmin Streets, Juna Subdivision, Matina, Davao City, 8000, P.O. box 145, Phillipines

⁹ 'SHEEP' Indonesia Foundation, Jl. Bimokurdo 11, Sapen, Yogyakarta 55221

¹⁰ Institute for Social and Environmental Transition - Nepal (ISET-N), Manasi Marga, Kathmandu Municipality-4, Chandol, Kathmandu, P.O.Box: 3971, Kathmandu, Nepal

¹¹ National Geologic Survey of Denmark and Greenland (GEUS), Oster Voldgade 10, DK-1350 Copenhagen K, Denmark

¹² Fondazione Eni Enrico Mattei (FEEM), Corso Magenta, 63 20123 Milan, Italy

Introduction

Farmers globally are among the first to experience changes in the weather. According to the IPCC (Intergovernmental Panel on Climate Change), the earth's climate is changing rapidly, which is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level. The geographic distribution of this warming varies around the world as reflected in computer model projections. It is however clear that in the long run, adaptation to change is needed as mitigation alone will not suffice. The frequency and magnitude of intensive rainfall and flood events, typhoons, cyclones and hurricanes as well as drought events are expected to increase in many regions while yearly rainfall amount may change.



Other effects are increasing incidences of pests and diseases. Moreover, sea-level rise is beginning to impact coastal areas inundating them in some cases and at a minimum causing saltwater intrusion. Groundwater is affected in other ways, as recharge of aquifers slows down in many regions while groundwater abstraction is high and increases by, among other uses, intensive agriculture under drought conditions.



Woman in rice field

Photo: CARE International in Vietnam

The agriculture sector is one of the most vulnerable sectors to a changing climate and as a consequence, food security and rural income. Rain-fed rural agriculture, in particular, will be hit hard as any long-term solutions may require high investments. As a result, adaptation in agriculture has to be based on low-cost techniques and easily accessed knowledge. An effective organisation is important to implement such techniques. This relates to on-farm level, but also for supporting services like extension services. Essential in adapting to climate change is the combination of local experience, science based knowledge, and the formal and informal education system, that together should provide for more sustainable agriculture under a changing climate.

This article is written by members of the CATALYST project network.

Capacity Development for Hazard Risk Reduction and Adaptation (CATALYST) is an EU- funded project which intends to strengthen capacity development for practitioners from diverse sectors involved in disaster risk reduction and adaptation, in the context of natural hazards. The project seeks, with the support of knowledgeable regional experts, to compile and analyse the best of knowledge from various regions of the world, in order to develop knowledge products useful to these practitioners. This article, describes briefly how adaptation is best implemented in rural farming and the ways in which education and capacity development as a whole can support this. Several examples from the project are used. Further information on the project and more examples can be found on the project website: <http://www.catalyst-project.eu/>.

From global climate change, to farmer level solutions

For farmers, to properly respond to climate change, they first must be able to assess the changes and the possible impacts they will have on the agricultural production. Farmers are familiar with extreme weather conditions that occur every now and then and are usually aware of the measures they can take to mitigate the effects. What farmers need in addition is to become aware of the fact that such extremes are more likely to happen so that they are able to take measures that are also valid for the longer term.



Planting together

Photo: CARE International in Vietnam

In a pilot in Vietnam, farmers were familiar with disaster risks and potential impacts on agriculture through their experience and several community based disaster risk reduction projects. Together with these farmers, climate information was tailored for better crop management. This showed that scientific information translated into simple, practical and tailor-made information for communities can be useful for farmers and local district agriculture officers. Local knowledge is the basis of adaptation, as farmers search into past practices for answers to climate-related changes. This holds particularly true for ethnic minority farmers that combine local species and crops with improved techniques to adapt better to extremes of drought and cold spells as shown in Vietnam. A combination of local

knowledge with scientific information is the most effective way to implement climate change adaptation measures. Moreover, a better educated farmer is able to absorb new information faster.



Rain fed agriculture in Honduras
Photo: Roland Bunch, Honduras

Another example in the Caribbean region showed that for Caribbean farmers, who mainly practice rain fed agriculture, information on the weather is very helpful to decide when to plant and what crops to plant. Such information, like a three-month forecast of probable precipitation, is currently made available from the Regional and National Meteorological Services in the Caribbean. The use of radio messages, mobile phone audio, text messages, pamphlets and flyers to supply discrete pieces of information to farmers are being considered.

Care should be taken that information is provided in a targeted way. An example in the Caribbean showed that a comprehensive, sophisticated training course offered through the World Bank portal appeared to be daunting to the prospective participants, whether extension officers or farmers. There was consequently a need to extract more “bite size” pieces of information, that relate directly to the farmer’s needs, for dissemination.

Adaptation and capacity development

With improved information, farmers are better able to adapt. They can, however, also benefit from new insights and innovations through improved education. Formal education is an important factor in this. For instance, the best channel to educate farmers in Nepal and Vietnam about the climate change and innovations to adapt is school. This approach is built on the belief that whatever children learn in school they take back home and share with their family. Generally parents with no or a low level of education tend to listen and believe what their children have learned in school and feel proud to take into consideration their suggestions.



Another example is the Pan-American School of Agriculture from Honduras, that is applying the Farmers School to train farmers in integrated pest management and agro-ecological practices to overcome erratic rainfall. For similar reasons, soil and water conservation practices are promoted in the Program for Sustainable Agriculture in the Hillside of Central America for application by small-scale hillside farmers in Honduras, El Salvador and Nicaragua.



Agricultural extension meeting in Nepal, 2002

Photo: FAO

Extension services as a form of informal education have been widely recognized and accepted in farm communities the world over. For climate-change related extension services it is important that it targets both the key farmers and the community as a whole, so that the community's decision-making reflects a sense of coherence and acceptance. This in turn improves knowledge sharing and enhancement. For instance, the timing of planting of rice can be coordinated among farmers as no one wants to be considered an outcast. Initiatives get a good chance if agreed upon in a wider group. Moreover, adaptation often depends on cooperation among farmers, as shown in the Juwana watershed in Indonesia, where water for irrigation is pumped from the river in dryer periods. As the lower part of the river is under tidal influence, the farmers taste the water before pumping to ensure that it is not salty. The farmers have established groups that specifically focus on ensuring water availability for agriculture through this method.

Another reason to aim for community-based adaptation is the higher influence that groups have on authorities as compared to individuals. This was demonstrated in Indonesia where farmers managed to convince the district authority to change the dam water distribution schedule to start in August instead of November in order to enable timely irrigation of their crops. Other advocacy work in Indonesia involves a river dredging program to reduce flooded areas and with that reduce the likelihood of harvest failure.

These two examples also suggest that governments play a central role in adaptation. National policies are often top-down and not linked to the daily practice. They can nevertheless provide for the enabling environment that farmers need to adapt. Extension services are a means to implement national policies, where care should be taken that they are tailored to daily practice and reflect community interests. This is shown in Italy where policies are in place to reduce the withdrawal of groundwater. However, irrigation associations that provide surface water for irrigation often apply volumetric water rates by blocks (where the lowest average net irrigation requirement have the lowest tariff) in order to keep consumption within reasonable limits to recover the water



Pumping water from Juwana river during dry season, managed by peasant group of South Jambean Village-Pati-Central Java

Photo: SHEEP Indonesia Foundation

distribution costs and the irrigation network management costs. Unfortunately, especially when blocks are not well set, this induces farmers to reduce their demand for water from irrigation associations and withdraw more groundwater which is not controlled. Currently, through the development of innovative water price models and the implementation of advanced irrigation system management procedures, farmers are reducing the groundwater exploitation in certain areas of Italy.

Nevertheless, farmer communities can take action like in Bangladesh where community people are cultivating climate resilience crops like saline, drought tolerant rice or start floating gardening in flood and inundated areas. Some of the farmers are also cultivating short and early varieties of rice. Still the farmers need scientific knowledge to adopt to the situation.

Sometimes more than education is required to support adaptation measures. In the event of a disaster, a three-phase approach is applied in the Philippines. The first priority is to provide immediate relief to affected families and communities through distribution of, for example, food packs, kitchen utensils, clothing, mats and blankets. Also important are debriefing sessions as an initial step towards the healing of emotional traumas, fear and anxiety induced by the disaster. The second phase is to address the livelihood needs of the community through the



After the cyclone
Photo: AFRIM



Post-disaster logistics
Photo: AFRIM

distribution of, for example, organic seeds and other planting materials for temporary crops (short term food) that community members can harvest within a few months to generate income. The third phase is to address the long-term needs of the community. This includes agricultural education that incorporates the concepts, tools and processes in community-based climate change adaptation and disaster risk reduction, addressing among others the use of suitable crops and seed banking.



Some conclusions on formal and informal education for rural agriculture

The various examples described in this article show that a variety of factors play a role to make adaptation in rural agriculture successful. In many cases, national policies exist that can support adaptation. Such policies are however usually top-down, have national targets and are not geared to the actual local situation.

Farmers may mistrust such policies as they do not seem to address their actual problems. More successful roads towards adaptation are found in agricultural education and community actions. Agricultural education is needed for farmers to help them understand also the broader situation and the mechanisms they are facing, and is needed for the introduction of innovations. Agricultural education can help farmers where technical measures are easy to implement but expensive while non-technical measures are cheap but difficult to implement because of lack of climate knowledge and experience in creative community processes.



Joint and voluntary work of peasant group of Tondomulyo Village to move the pump for adjusting water elevation from Juwana River-Jakenan, Pati, Central Java

Photo: SHEEP Indonesia Foundation

Community action helps farmers in situations where special skills are needed or joint actions. It also helps in cases where pressure is needed to change situations. Moreover, community action is often effective as it builds on local

knowledge while the interaction between communities helps certain practices to spread more easily. Where government fails to fulfil this role, NGO's often are important in promoting capacity development and in building community actions. National policies are however needed to ensure a large scale (national) perspective and operation, combined with bottom-up measures to ensure applicability. This is, for instance, shown in the initiatives towards the reuse of treated wastewater where local communities are worried about possible environmental risks and damage to human health. Education and knowledge transfer has led to changes in farmers' attitude toward the reuse of wastewater for irrigation. In all this, attention is needed for legal and institutional settings that hinder adaptation or even aggravate climate change effects.

One of the main constraints to development that many farmers in poorer countries face is isolation, and a feeling that there is little they can do to change their lives. It is important for extension services to fine tune their programmes to farmers' needs and possibilities, helping them to take the initiative and generally encouraging them to use local and national resources. Equally important is to convincing farmers that they can make decisions that will help them to adapt and that they have the ability to break free of their poverty.



Working in the rice field
Photo: Yubaraj Satyal, Nepal

**Additional reading:***Central America and the Caribbean*

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- Shifting the Response Terrain: <http://www.i-s-e-t.org/images/pdfs/Shifting%20the%20Response.pdf>
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www.sheepindonesia.org/en/?page=news&viewid=25
- Risk Reduction, A Solution Against Juwana River Flood:
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