Improving the robustness, sustainability, productivity and eco-efficiencies of rice systems throughout Asia

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About the Project

This project built on the successes of an earlier APN project (Applying Climate Information to Enhance the Resilience of Farming Systems Exposed to Climatic Risk in South and Southeast Asia; APN 2004-01-CMY) that established a global network of systems scientists. The project came at a critical period for the world's food systems. Unprecedented confluences of pressures are resulting in the '2050 challenge': the need to increase global food production by 70% in order to feeding a growing number of people with dwindling resources such as land and water. It also comes at a crucial period in rice systems modelling, recent advances in systems modelling now make it feasible to detail the economic and environmental consequences of transformational changes such as switching from flooded rice systems to aerobic rice.

The aim of the project was to empower the next generation of scientists and policy makers in providing the most pertinent advice and in making the right decisions when it comes to redesigning current approaches in resource allocation, agronomy and knowledge dissemination. Thirteen young scientists were trained throughout the project resulting in five peer reviewed journal publications, along with three conference publications, a notable achievement from a training and networking project.

'I was fortunate to be a member of UTAS-led rice project, funded by the Asia-Pacific Network for Global Change Research (APN). In this project I had the opportunity to engage with the international collaborative network of rice researchers to propose and design optimal rice-based systems for Pakistan with improved use-efficiencies, in particular for water.'

Masood Iqbal Awan,
University of Agriculture, Faisalabad, Pakistan.

Some of the key Project outcomes were:

- An Increased capacity of scientists and their institutions to use simulation modelling and implement farming systems research;
- Better understanding of the locally specific challenges for developing robust rice systems;
- Agreement on the most appropriate research priorities based on extensive stakeholder consulations;
- An international, multi-disciplinary network of scientists, committed to developing robust and eco-efficient rice systems that can begin to meet the future demand of a growing population and a changing climate.

Final Meeting

The final workshop was held at the Bogor Agricultural University, Indonesia from November 16 to 18, 2016. The workshop provided professional development to the participating project scientists involved in farming systems (rain-fed and irrigated rice). Six scientists from four countries participated.

Final workshop at Bogor, Indonesia.

As part of the final workshop meeting, summaries and results were presented by the participating project scientists. The main theme was 'Systems thinking, supported by simulation modelling (APSIM) to integrate disciplinary knowledge and provide proactive evaluation of technologies and policies'. A key objective of this workshop was developing participants' capabilities for providing policy-relevant advice on issues that can be contentious (e.g. GMOs, climate change etc). Participant developed convincing policy briefs based on their own, individual research and within the context of their home country.

A small, highly diverse and trans-disciplinary group of scientists were invited to the workshop. Their fields of interest covered the widest possible range such as:

- Developing climate change scenarios for Indonesian rice systems,
- Gene-editing techniques to develop salt-tolerant rice,
- The introduction of water-saving aerobic (non-paddy) rice systems and
- Conservation policies for paddy rice to avoid ecosystems losses due to land use changes.

Usually scientists covering such a wide range of topics would never meet; the conferences they would chose to present their work would be many disciplines apart. However, at our workshop we created transdisciplinary synergies that are normally missed.

During the workshop every participant had to:

- Write a short scientific paper based on their original research;
- Develop a personal profile suitable for social media such as LinkedIn;
- Develop an elevator pitch describing the value of their work in about 150 words to a non-scientific audience and
- Write a 2-page policy brief that provides the scientific basis for new public or private policies that are grounded in their original research.

The workshop showed that a common task and purpose can bring scientists from across the scientific spectrum together and create new, professional networks and outcomes beyond their expectations. We used foresighting as a means of bringing everybody together by imagining what our rice systems might look like in 10 years' time. The final workshop was very productive and enjoyable, building upon the previous 3 years of collaborative and international partnerships. For individual policy briefs visit www.apnrice.com

APSIM Training in Australia

Three of the young scientists visited the University of Tasmania (UTAS) (Hobart) in the later stages of the project; Ruwanga Amarasingha, Akhmad Faqih and Anria.

Ruwanga Amarasingha visited UTAS from September to November 2015. While in Hobart, Ruwanga presented two farming systems papers at the Australian Agronomy Conference. Ruwanga also worked with the Australian modelling team to advance Sri Lankan applications of rice systems research. This involved i) Simulating/evaluating the yield of rice (i.e. short medium and long duration) under different agro-climatic conditions in Sri Lanka, and ii) identifying the potential and risk areas for rice under future climate change scenarios. Ruwanga's work was further developed into two peer-reviewed publications.

Akhmad Faqih visited UTAS during April and May, 2016. Faqih worked with advancing Indonesian applications of rice systems research. Faqih's initial focus of his visit was

on the analysis of projected climate data from a Regional Climate Model (RCM4). His work included the validation of the projected GCM climate data against observed historical data via an analysis of both daily data and monthly and annual means for regional West Java. Faqih then quantified the changes in both the climate and climate variability using the projected climate data in comparison to a long term baseline period of 1981 to 2010.

Anria visited UTAS during May and June, 2016. Anria's work followed on from Faqih's in using the projected climate data. Anria also worked closely with the Australian modelling team to advance Indonesian applications of rice systems research. Anria used the projected GCM data from the RegCM4 for parameterising/validating rice phenology and yields under various agro-climatic conditions in West Java, Indonesia. Additionally, Anria quantified the projected climate impacts, potential rice yield gaps along with productivity options and crop phenology.

The visits to UTAS of Ruwanga, Faqih and Anria strengthened ongoing relationships and enabled the opportunity for each to engage with broader scientific peers.

Potential for further work

Rice is one of the world's most important crops, principally in Asia where 92% of the world's rice is produced. South Asia alone produces about 40% of the world's rice and is home to about 25% of the world's population. To maintain regional self-sufficiency in rice, irrigated and rainfed rice systems must achieve greater yields with fewer resources, while facing other challenges relating to diverse issues such as labour shortages and environmental impacts. The key challenge for South Asian rice producers is to ensure food security with diminishing water resources. This project focused participants' attention on this global challenge. The project highlighted the usefulness and need of applying systems approaches to rice-based cropping systems in Asia. In particular, future projects should also investigate a broader and more diverse range of agricultural climatic zones as well as deepening scientists' abilities to communicate effectively with policy makers and the general public.

Contact Us

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