	Theme 3. Fresh water availability and access
PR 3.2	**Implementing climate resilient water management projects to increase adaptive capacities, food security & avoid conflict over resources: Examples from Thailand, India, the Netherlands and Spain**
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Introduction

Climate change, salinisation and economic development demand an increased level of self-sufficiency of fresh water supply. Water supply at the regional level, especially towards agriculture, as big user of fresh water, will have to become more climate resilient and robust. The use of existing sources of fresh water needs to be improved. There is a need for innovative and improved solutions to retain fresh water. The use and distribution of fresh water needs to be made more efficient. Climate change asks timely measures and also new practices and innovative solutions. In the session a number of cases were presented, covering both high-tech and low-tech solutions in different countries.

Where the rail falls project, India

Aurélie Ceinos, CARE, France

Where the Rain Falls is a three-year programme of research, advocacy, and adaptation activities on changing weather patterns, hunger and human mobility. Field research was conducted in eight countries. Presented in the session was the project in the Jashpur District of the Chhattisgarh State. It is a rural district, where farmers are heavily dependent on the production of a single annual crop of paddy rice grown during the monsoon season. The region is drought prone, water scarcity is the biggest issue. Access to credit facilities and government programmes is low. Women are responsible for 60% of the agricultural activities and often also for getting water. In dry season they have to get water from sources up to 5 km away. The number of months they have to use these far-away sources is increasing.

The project seeks to address chronic risks like increasing food and water insecurity because of climate change and impacting women's access, control and management of natural resources. The project has a low-tech approach, focusing on short-term solutions facing coming droughts, while at the same time working towards village development communities. Components of the project are meeting water needs, disaster risk reduction and establishing a notion for planning for the next season. An important aspect is a collective approach, strengthening community skills in fresh water management. Among the solutions is an improved "5%-model", digging water ponds with a surface of 5% of the field for water storage. Also measures are taken to trap runoff water and using subsoil irrigation. Benefits are a better food security and increasing soil fertility. Improving agricultural management is also necessary, for example promoting the growth of pulses as additional food source and agroforestry. The focus is on improving traditional methods.

Village Development Communities are an important part of the project. A platform to discuss water risks and exchange water management and agricultural practices was lacking. Providing information on about weather and climate enables villagers to judge the risks and adapt their plans to expected weather conditions. It is necessary to downscale information to the needs and skills of the community.

Forming self-help groups has proven very effective. Next phase is a scaling up of the project. This brings a need to incorporate local authorities for example through shaping MNREGA scheme for tribal communities which

could provide financial resources for 5% model. What is also needed is a right based and integrated approach to water management.
Link: http://whereverainfalls.org/wp-content/uploads/2016/05/WRF-WaterManagement-VF.pdf

Spaarwater project, Netherlands,
Jouke Velstra, Acacia Water, the Netherlands
The project is located in the Ijsselmeer region, a region mainly below sea level. Agriculture is possible due to fresh water lenses in the subsoil. To flush out saline seepage, the regional water system is fed by fresh water from the river Rhine. On average the fresh water supply is adequate, but locally the water supply is at the wrong place at the wrong time, while salinity is an enduring problem. With climate change, an increase in evaporation is expected, with a surplus of rainfall in winter and an increasing shortage in summer. The discharge of the rivers in summer will also decrease.
To cope with these problems a number of technical solutions is tested, using several sources of fresh water, storage techniques an efficient water use for agriculture. A project in the village of Borgsweer use tile drainage in combination with subsurface storage in a layer at 10 to 20 meters below surface. There are 1 infiltration well and 3 extraction wells for an area of 20 ha. The project results show an increase in crop yields up to 25% depending on the crop, reduction in crop diseases and efficient water use. Another project on the island of Texel uses an open storage, tile drainage and sub-irrigation through the drainage system.
The project results show that a self supporting fresh water supply is within reach using fresh water harvesting, water storage and efficient water use. Is it important to combine these solutions. The system is expensive, to make adaptation worthwhile the additional benefits as yield increase and disease reduction are essential.
The type of solutions developed in the project is now adapted and tested in other countries, such as Uganda, Kenya and Ethiopia.
Link: www.spaarwater.com (Dutch), http://en.acaciawater.com/nw-29143-7-3578302/nieuws/decision_making_on_subsurface_freshwater_storage.html (English)

Fresh water conservation and dealing with salinity in the South-western Delta, Netherlands
Vincent Klap, Zeeland Provincial Authority, the Netherlands
The Dutch South-Western Delta is a region with scarcely a possibility of fresh water supply from the big rivers Rhine and Meuse. The only source of fresh water is precipitation. The annual precipitation surplus is 21 cm. The region aims at reaching self-sufficiency by using that precipitation surplus. That means increasing availability of fresh water and decreasing demand. A number of pilot projects has been started to reach these goals.
For increasing availability subsurface water conservation, mainly by increasing fresh groundwater storage appears to be effective. Upgrading water quality, mainly by decreasing salinity can be a solution for providing industrial plats with fresh water. Conservation in surface waters is not very cost-effective. Pilot projects for decreasing demand are among others development of salt-resistant crops end improving the quality of the soil.
Reaching self-sufficiency is not only a technical but also a mental issue: the existing knowledge of farmers is not always correct, for example about the sensitivity of crops for salt water. In some area's farmers will also need to consider a move to different crops. Providing high-quality information is one of the focal points of the project. An example is an airborne survey of salinity in the groundwater, which was conducted in 2015. This year the information will become available on the internet.
Link: https://www.zeeland.nl/water/zoet-water (in Dutch)

Fresh water supply and water use in the Mediterranean: the Spanish approach
José Miguel de Paz, Instituto Valenciano Investigaciones Agrarias-IVIA, Spain
This is a project in the region of Alicante on the east coast of Spain. There is not enough rainfall, so there is an irrigation system with two artificial reservoirs. Water supply varies, last year the reservoirs held only 35% of their capacity. High salinity is a major problem, the salinity of the water supply is quite variable, regular reaching levels of 3 to 6 EC. Farmers cope with this problem by cultivating salt tolerant crops like palm, artichoke, alfalfa, broccoli and melon and by irrigating extra water to leach the salt. There is an organisation in irrigation districts with a strict system of irrigation shifts and re-using water up to 5 times.
With climate change more evaporation is expected and new solutions are needed. A system of drip irrigation has been tested. It appears to increases production and has an efficient water use. It has a lower capacity in leaching salt than surface irrigation, however. There has also been a test with subsurface drip irritation, which is more effective in leaching salt. In development is a new desalinisation plant using new technology.
As the salinity in the water varies considerably, a better monitoring is very important. As more sensors are installed, it becomes possible to make better informed decisions to irrigate a field of not to irrigate.

Results of the projects are being discussed with the farmers.
Link: www.ivia.es

Discussion

In the wrap-up of the session a number of questions and attention points came up.
In all the projects scaling-up is a major challenge. Social issues are an important factor in nudging farmers and other water users in accepting potential solutions and technologies. On a larger scale and on the long term reducing livestock production should be considered, as this takes a huge amount of fresh water and contribute to GHG emissions. This could have a bigger impact on self-sufficiency of fresh water than water conservation by method like storage in the subsoil. At last, mitigation of climate change remains important.