

# Integrating food security & water & the impact of climate change

*Background paper for session 2 by EKN Dhaka and EKN Bamako, including the outcomes of the discussion during the Food Security Exchange week.*

## Why does it matter?

Resilient agricultural production is a necessary (though not sufficient) element to achieve food security. Water is a very determining production factor in agricultural production. Depending on the season and on location, water can be scarce, abundant or in excess. Drought, flooding, waterlogging, salinization and depletion of groundwater reserves are all - to varying degrees - consequences of insufficient management of water. This jeopardizes agricultural production in certain periods and areas, hence the need for Integrated Water Resources Management (IWRM). At the same time growing populations and a growing worldwide demand for diverse, nutritious and safe food have increased the need to raise water productivity in agricultural production. As climate change renders water quantities even more volatile, it should be part and parcel of an integrated water management approach. The more so in a Sahelian country such as Mali, which needs to cope with desertification, and in the coastal zones of Bangladesh that have to deal with rising sea levels, river erosion and higher frequencies of cyclones and related floods. In these countries, food security that is climate resilient thus means investing in the physical protection of farm land, through afforestation, land reclamation and flood control.

Another important aspect of the interrelationship between food security and water management is health. Unsafe drinking water and sanitation conditions go to the detriment of positive impacts of more nutritious food intakes. Therefore, WASH could be part of a food security project (as it is in one of the five water/food security projects in Bangladesh).

Water safety can also be an important issue with regard to the quality of ground water used for irrigation. A large number of tube wells in Bangladesh have been found to produce water with high arsenic concentrations. These tube wells have been banned for the use of drinking water, but not for irrigation. The food safety lab EKN Dhaka has been funding with the Ministry of Health has detected concentrations of arsenic in rice that are too high by international food safety standards. Rice being the main staple crop could lead over time to arsenic accumulation in the human body and pose grave health hazards.

At the same time, the development of sustainable agricultural systems should contribute to reducing water and climate vulnerability, e.g. by applying good agricultural practices, applying a river basin approach to take into account consequences of water intakes on production downstream, using efficient irrigation and drainage systems, avoiding low spots when levelling farm land to avoid breeding places for mosquitoes transmitting malaria (e.g. in Mali) etc.

Food security and water management are thus interrelated, with climate change influencing both themes separately as well as in relation to each other. One should therefore tackle the three themes in a concerted manner in order to achieve sustainable results in each of the areas.

From an opportunities perspective, linking food security to water management can make stronger contributions to local economic development and help structure local economic governance.

In the water management projects in Bangladesh, water management groups have been established and trained becoming the basis for organizing agricultural producers in the form of cooperatives or other modes of collaboration. This helps them improve their farms, strengthen linkages with input and output markets and develop a stronger business orientation. In this manner water management also has a positive effect on food security. The urgent need for farmers to cooperate on water issues in

coastal areas encourage them to start cooperation – for which the need is less urgently felt – in agricultural production and marketing as well. Cooperation in agricultural production and marketing as well will also help water management groups to stay active throughout the year and not only in those parts of the year that attention for water management is most required.

## What have we done on this topic?

### EKN Bamako

In its current programmes of water management for food security in the Office du Niger and in the Inner Delta of the Niger River, EKN Bamako focuses on efficient water use in agricultural production by:

- Improving the efficiency and effectiveness of irrigation systems (e.g. optimal use of gravity for irrigation and drainage, timely maintenance to keep systems free of water plants etc.).
- Improving the management of the irrigation water by the water users themselves (e.g. sticking to an efficient passage of the water through the system and sticking to the agricultural calendar to optimize the use of the available water).
- Optimizing the positive aspects of flood water (soil fertility) through controlled flooding instead of flood control.
- Rainwater harvesting for irrigation.
- Introducing crops and varieties that consume less water.
- Promoting good agricultural practices to preserve soil quality.
- Conflict resolution between agricultural producers and cattle farmers/herders that all depend on the scarce water resources.

For its programme of strengthening agricultural value chains for food security, EKN Bamako has selected agricultural value chains that have their production basis in the basin of the Niger river, which is the area we target with the IWRM approach. These value chains have a high potential for value addition without compromising on sustainability of production. The proposal we await through a tender procedure will be judged against criteria on food security, water (esp. 25% reduction of water use) and (environmental) resilience.

Rather than a number of isolated irrigation projects, the upcoming IWRM programme envisages the application of a river basin approach, in which the impact of proposed developments of certain production areas on the opportunities in the production areas downstream are taken into account.

### EKN Dhaka

The embassy has a long history of involvement in the water sector in Bangladesh. While some of its past water projects contained elements of agricultural development, it was the advent of food security in 2012 as a priority theme that really made it possible to work fully and comprehensively on linking up agricultural development with water management. While presently a number of EKN's water and food security projects are working in areas not related to the water-agriculture nexus, five projects actively link value chain development for food security with IWRM through the combination of water management and food security in one project or through co-location of a water project and a food security project. These projects are partly funded from the SBE Water and partly from the SBE Food Security.

In these projects the improvement of food production is taken up in areas benefiting from integrated water management. These are polders in the coastal areas that were initially established primarily for

flood control, but which need to be rehabilitated and refurbished to make them more fit for agricultural development, for instance through deepening of drainage ditches so that these can store water during the dry season.

The relation between food security and water management in these projects is expected to be mutually beneficial in that:

1. Improved water management (flood control, drainage and on-farm water management) will improve agricultural production; whereas
2. increased income and food security derived from improved agricultural production will generate funds for operation and maintenance of water management infrastructure.

Unlike Mali and the northern part of Bangladesh, the need to economise on water for agricultural production in the coastal polder areas only occurs during the latter part of the dry season. The major water management challenge is drainage in this area, not water scarcity.

## What are the future developments?

Both food security and water management are high on the development agenda in Mali, Bangladesh and many other countries. Their interrelation, however, seems to be less explicitly addressed at the macro (policy) and micro (local) level; there is ample scope for improvement here!

For Mali, the following options are being addressed:

1. Make sustainable choices between production areas and crops to produce.
2. Better maintain water systems.
3. Better predict the quantity of water, before the planting season (geodata, sharing information across borders).
4. Monitor water quality.
5. Focus on food security and water efficiency through increasing *productivity* rather than *production*.
6. Focus on food security through reducing post-harvest losses.

These options, however, present some difficult dilemmas:

- Switching from one production area or one crop to another is not evident, when political vision and related policies (but also the vision of many donors) are based on the principle 'more of the same'.
- The same goes for the focus on productivity and reducing post-harvest losses in a setting where government and many donors continue focusing on higher production levels.

In Bangladesh EKN Dhaka's 'water cum food security' projects will continue to harness water management in coastal areas for agricultural development. As such, the projects are at the same time a deliberate attempt to improve intersectoral coordination at the micro-level. At the same time, by involving both the Ministries of Water resources and Agriculture in these projects, EKN Dhaka also hopes to contribute to the improvement of coordination at the policy level. Coordination between the water and agricultural sector – and several other sectors as well - is also addressed at an even higher level through its support for the preparation of a Delta Plan.

An important consideration in the collaboration and coordination between the water and agricultural sector is the need for the diversification of agricultural production shifting away from rice to high value crops, which will increase the added value per unit of water used, thereby increasing the efficiency of water use. In this connection, the decreasing consumption of rice in favour of more nutritious foods

induced by food security projects may reduce the pressure on rice production and make more water available for less water consuming crops.

## What have we learned?

### EKN Bamako

In the programmes of water management for food security in the Office du Niger and the Inner Delta, improved water management has allowed for more available food and higher revenues (e.g. a one year sum of investments yielded three times that amount in production value in the Inner Delta; in the Office du Niger, average net household incomes increased by 600% in real terms between 1989 and 1998, crop diversification increased as well as land productivity (t/ha).

As the value chain programme is not yet operational, we have not been able to test the approach of interrelating the two themes the way we look at them now (crossing a river basin approach with a value chain approach).

Also in the case of Bangladesh, water/food security projects are still in an initial stage. So it is too early to say how successful they will be. However, from the experiences with previous Dutch-funded projects focusing primarily on water management, we know that the – sometimes somewhat accidental- impact of improved water management in coastal areas on agricultural production can be substantial. Here, thanks to improvements in water infrastructure (embankments, sluice gates, drainage channels and the like) and better operation of this infrastructure, water logging was reduced and cropping intensities increased as a consequence.

In Bangladesh an institutional and technical gap exists between ‘macro-water management’ (inter-polder management) and micro-water management (crop water management: within the boundaries of one single field). The technical expertise and mandate of the Bangladesh Water Development Board stop short at the embankments surrounding the polders, while the Department of Agricultural Extension, which focuses its work on individual farmers, has only knowledge of water requirements at the crop-field level. There is no institution dealing with water management at the intermediate level, where farmers not only have to consider their own water needs, but also those of others as well as the physical characteristics of the hydrological unit in which they operate. The lesson here is that if only left to the existing institution, without special support, this development of intermediate water management will be hampered.

## What could others learn from our experiences?

Some lessons learnt to share for the benefit of others that work in the same fields are:

- Water management should not ONLY be considered to be a goal in itself. One should pay more focus on the purpose(s) which water management is intended to serve, such as food production.
- When activities on water management are integrated in food security programmes, one can increase the impact of food security activities through securing access to and control over water.
- One can then also make more realistic choices as regards food security interventions, taking into account that IWRM needs to serve a whole range of water-related interests and the political priority may not always be set on water for agriculture.
- This is even more the case in trans boundary water basins such as those in Mali and Bangladesh. If decisions on water diversion by neighbouring countries cannot be influenced,

food security programs should provide ways to deal with the consequences. E.g. due to decisions by neighbouring India, in some places in the coastal areas of Bangladesh the available surface water may become so saline that agricultural production is no longer feasible; here farmers have no choice but to shift to saline fish and shrimp culture.

- One should not assume that technical knowledge and institutions present in a country or region effectively cover the successive levels of water management for agricultural use.

## What are key challenges and opportunities?

Some challenges in the concerned countries:

- Will it be possible to continue matching decisions on water use with decisions on agricultural production in view of increased needs of other users (e.g. industries, hydro-power installations) and if not, will it be possible to make a responsible (and socially acceptable) choice between them?
- Again, in the framework of IWRM, where water resources are also needed for non-agricultural purposes, there may be less water available for agriculture. It is therefore essential that water for agriculture is used as efficiently as possible to optimise food production. Not all farmers may be capable of doing so. Those that aren't should be enabled to take up alternative livelihoods. When water is becoming very scarce, it becomes too costly to use irrigated agriculture as a social safety net.
- A major challenge for Bangladesh is to show that food security/agricultural development will provide the drive and financial means for the operation and maintenance of water management infrastructure.
- To make national agricultural and water policies coherent and to provide for concerted actions in the field.
- For effective IWRM and crop water management, reliable data on water resources, water use and the economic costs and benefits of activities for which water is used, are necessary.

Some opportunities:

- Linking the topics can increase success rates on each of the topics, to a level that would not be attainable when the topics would be pursued separately. This is not limited to the direct effect of better water management on agricultural production, but also the economic attraction this subsequently may have on entrepreneurs as well a motivating force on policy makers to push the integration of water and food security further. EKN Dhaka hopes to be able to capture this, for instance, through its support to the preparation of a Delta Plan for Bangladesh.
- Spin-off effects could be created in the field of innovations, both technological and institutional (e.g. new varieties, new irrigation systems, geodata, applying the model of Waterschappen, water managers in branch organisations etc.) . This possibility of mobilising the expertise of Dutch water boards for strengthening water management groups and associations is currently being explored in Bangladesh.
- To realise the potential synergies between WASH and Food Security through integration of this aspect in water /food security programmes and/or through linkages with the SRGR programmes.