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CPWF Ganges Conference Brief 1
October, 2014

Photo: Mahabub

Water Smart Communities

Opportunities

The water and land of the coastal zone of Bangladesh are rich, valuable and under-utilized resources. They could be used to improve food security and contribute to poverty reduction through agricultural growth. As described in these briefings, opportunities do exist to increase the agricultural and aquacultural productivity of the coastal zone. Implementation of these recommendations can support current and future coastal zone investments, national plans of the Government of Bangladesh and the orientation of policies.

Realizing the opportunities

Achieving Water Smart Communities in the polders requires integration of policy implementation, which requires greater coordination between institutions responsible for water management and food production and dissemination systems. This approach would support:

- Investment in infrastructure improvement inside the polders to enable drainage and to create hydrologically-defined Water Management Units (WMUs);
- Investment in the creation of communities that cooperate around water management and production systems within and across WMUs;
- A transparent and accountable water governance framework that formalizes and enhances the role of local government institution representatives;
- A viable strategy for maintenance of infrastructure;
- An integrated approach to supporting these communities in terms of governance, access to technical expertise, access to input and output markets and microfinance

Overall, what is required is an integrated approach by government, the private sector, donors, NGOs, and government ministries, departments and local government institutions. By working together, these groups can support the trans-disciplinary approach necessary for achieving Water Smart Communities. In turn, Water Smart Communities can contribute to Bangladesh's food security, raise the living standards of those living in rural regions of the coastal zone and ensure that polder ecosystem services are available for future generations.

For more information, please visit : www.waterandfood.org and www.wle.cgiar.org

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Agricultural Production and Drainage

Problem

Deep and prolonged inundation inhibits cultivation of the short-statured, short duration, high-yielding aman varieties that can enable cropping system intensification, in particular the production of high value rabi crops.

Background

When originally constructed in the 1960s and 70s, the primary function of the polders was to protect life and prevent tidal flooding and salinity intrusion. The design enabled the cultivation of a tall-statured, long duration traditional aman crop that could withstand a water depth of up to 60 cm. Large areas inside the polders were inundated at depths greater than 50 cm for several weeks, preventing farmers from diversifying their farming systems. This continues to be the situation today over much of the coastal zone. While the aman crop remains dominant, it is sometimes followed by a low-input, low-yielding rabi crop. However, planting is often late due to the late maturity of the traditional aman varieties, which frequently leads to serious rabi crop damage or even total destruction from early kharif rains.

Recommendation

Good drainage can reduce inundation depth and duration, which will enable:

- cultivation of early maturing, high-yielding aman varieties
- drainage shortly prior to aman harvest, facilitating soil drying and thus early (timely) establishment of rabi crops; this will result in higher yields for traditional rabi crops and enable diversification to high-yielding, high value crops such as maize, sunflower and watermelon.

Low cost gravity drainage is possible in most of the polder lands because of the large diurnal (tidal) water level fluctuations (up to 2-3 m) in the rivers surrounding the polders. At low tide the water level of the rivers is normally lower than the land level inside the polders. This allows for gravity drainage simply by opening the sluice gates. The gates can be closed again when river levels rise.

Good drainage also requires dredging of the internal polder canal networks (khals). The khals have silted up over the years, and desilting them also greatly increases their capacity to store freshwater for irrigation during the dry season in locations where the river water becomes too saline for irrigation. Secondary, tertiary and field canals also need to be constructed for improved drainage, with the added benefit of serving as irrigation canals.

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Governance by Small Water Management Units

Problem

Conflicting interests of different stakeholders involved in polder water management, which often manifest in disagreements over when to open and close sluice gates, prevent the adoption of more intensive cropping systems and create inequity in decision making regarding resources.

Background

While drainage is a prerequisite for increasing agricultural productivity in the polders, this alone will not create the conditions needed to realize production potential. Land elevation within the polders varies considerably; there can be a difference of 10 to 30 centimeters over a distance of 10 to 100 meters, and 1 to 2 meters variation across a wider landscape. In the absence of barriers, water flows to the lowest point in the landscape. The needs of farmers in lower lying areas often conflict with the needs of those in upper parts. For example, keeping sluice gates and flushing pipes open until the higher lands are flooded for rice cultivation results in too much water in the lower lands, and fosters conflict within communities.

Recommendation

Water management units (WMUs) need to be created and managed based on the hydrology of the landscape and the shared interests of those farming within the units. In addition to reducing water management conflict, the creation of small WMUs would allow farmers to take advantage of more productive cropping system options. Such units might be 50 to 100 hectares in size.

The physical creation of WMUs need not be technically difficult or costly, and could take advantage of existing rural infrastructure including roads, embankments and culverts. Small dykes would need to be constructed in places to separate lands of higher and lower elevations, and farmers within the WMUs could construct networks of small drains/channels to facilitate drainage or irrigation. Each WMU should have the capacity to control the times and rates at which water flows in and out of its boundaries and would need to be linked to a *khal*.

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Community Approach to Water Management

Problem

Lack of coordination is a major impediment to realizing the potential of the coastal zone. This issue is tied to decisions regarding the scale at which water within the polders is best managed, as well as current frameworks and policies that promote community water management. 'Community' is often defined at the village-scale, which does not always coincide with natural hydrological boundaries.

Background

The hydrology of the polders of the coastal zone is completely different from other parts of Bangladesh, governed by the natural phenomenon of tides, human interventions in the form of embankments, roads etc., and topographic variations. Therefore, it is usually impossible for an individual farmer to manage water - a community approach based on small water management units (WMUs) is required to realize production potential. For example, if most farmers want to grow high-yielding *rabi* crops (such as maize, sunflowers or vegetables) and traditional crops of sesame and *mungbean* with minimal risk, early rice harvest (with drainage shortly prior to harvest) is necessary. This will require growing high-yielding *aman* varieties that mature earlier. However, if some farmers wish to continue to grow traditional varieties, they will want to bring river water in at the same time as others want to drain. Furthermore, early-maturing rice crops grown in small patches risk heavy damage by rats and birds.

Recommendation

Coordination of water management and production systems needs to be based around WMUs, not villages. Owners and lessees of land within a WMU should engage in collective decision-making, taking into consideration available infrastructure and the biophysical resources of the WMU. This would enable the adoption of farming systems that provide the best return options for the farmers. At the same time, it could provide a plan for ensuring that ecosystem services are sustained for future generations.

Water management requirements will depend on the preferred cropping systems/technologies that farmers within a WMU want to adopt. There needs to be considerable shared interests and needs amongst farmers.

Within sub-polders, coordination of WMUs on water management is necessary. Co-ordination will be required, for example, to decide whether to allow the entry of saline water or to store freshwater during the dry season.

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Improved Agriculture and Aquaculture Cropping Systems

Problem

Current productivity of agriculture and aquaculture systems in the coastal zone is far below potential.

Background

Most polder farmers in medium salinity environments grow a single *aman* crop using tall, local varieties that can survive stagnant flooding, but are low-yielding (2 to 3.5 tons per hectare) and slow to mature. The *aman* crop is often followed by a late-planted, low-input and low-yielding (approximately 0.5 tons per hectare, but much less in some years) legume crop, and about 1 million hectares of land lies fallow during the dry season. Most fish and shrimp ponds produce much less than 1 tonne of aquatic produce per hectare per year.

Recommendation

There are tremendous opportunities to improve food security and livelihoods in the coastal zone with existing advances in crop and aquaculture technologies and available water resources across all lands and salinity regimes. Many well-tested, short duration, stress-tolerant rice varieties, and high-yielding, high-value *rabi* varieties are now available. Additionally, newly available aquaculture species that can be raised separately or together with shrimp enable more productive and less risky year-round polyculture. Based on the results of several years of on-farm demonstrations, CPWF recommends the following:

- In low salinity areas (much of Barisal division):
  - *Aus-aman-boro* (15-17 t/ha/yr)
  - *Aus-aman-rabi* (9-10 t/ha/yr rice plus 9 t/ha maize, 3.5 t/ha sunflower, or 38 t/ha watermelon)
- In moderate salinity areas (e.g., parts of Khulna district):
  - *Aus – aman* (8 t/ha)
  - *Aman – boro* (10 t/ha)
  - *Aman – rabi* (4-5 t/ha rice plus 7 t/ha maize, 2.5 t/ha sunflower)
- In high salinity areas:
  - Aquaculture-rice systems with brackish water shrimp and fish polyculture in the dry season and rice and freshwater fish and prawn in the wet season
  - Aquaculture-only system with brackish water shrimp and fish polyculture in the dry season and fish polyculture in the rainy season

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