

Improving water productivity in the northwest region of Bangladesh

Bangladesh has gained self-sufficiency in rice production. With the population of 76 million in 1977, total production of rice was 11.6 million tonnes (152 kg/capita). Now in 2012, with the population of 153 million, the total production of rice has increased to 34 million tonnes (222 kg/capita).

Production increases have resulted from a substantial intensification of agriculture rather than from increases in land area available for cultivation. The overall cropping intensity for the country has increased from 148.9% in 1977 to 183% in 2010 with an increasing proportion of land being double- or triple- cropped. This growth in intensity was driven by increased cultivation during the dry season, particularly *Boro* rice, made possible by the growing availability of irrigation. *Boro* rice currently (2012) contributes more than 55% of the total rice production of the country from about 42% of the total cultivated area of rice.

There was phenomenal growth in irrigation development over the last 3 decades (Figure 1). Total irrigated area has increased from 1.52 million ha in 1983 (18% of the net cultivable area) to 5.4 million ha in 2013, (63% of the net cultivable area). This growth was driven by the growing use of groundwater through rapid increase in the adoption of shallow tubewells (STWs, Figure 2). The number of STWs has increased from 93 thousand to 1.52 million during this period. The number of deep tubewells (DTWs), which also pump groundwater, has increased from about 14 thousand to 35 thousand.

Northwest region (Figure 3) has the highest percentage of net cultivable area irrigated in 2012-13 (around 85%) and has the most intensive use of groundwater; over 97% of the total area is irrigated (2012-13) by groundwater. This region is considered as the food basket of Bangladesh. The region produces 34% of the country's total rice, 60% of the total wheat, and more than 2/3 of the total production of potato and maize.

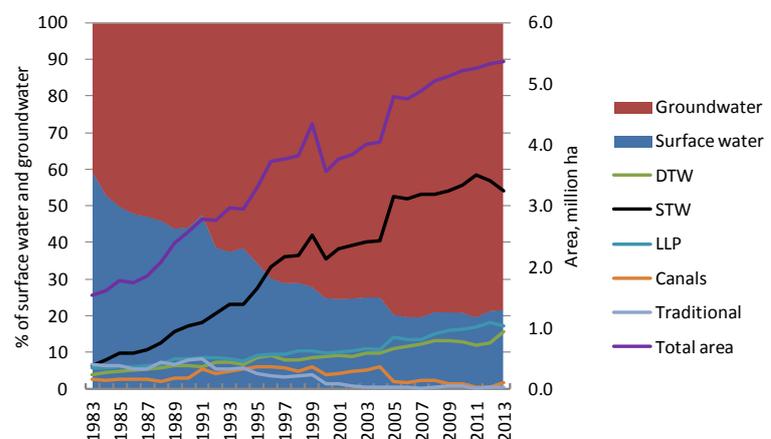


Figure 1 Area irrigated by different technology and source of water between 1983 and 2013



Figure 2 A STW pumping groundwater to irrigate rice field

In recent years, there are serious concerns about the sustainability of groundwater use in the northwest region. Many studies show that groundwater levels are falling and that the use of shallow aquifers for irrigation in the area is unsustainable. Due to this concerns, the Government of Bangladesh intends to decrease dependence on groundwater by increasing use of surface water for irrigation and also reduce pumping through crop diversification and improved management, hence increasing water productivity.

The objectives of this study in Bangladesh is to understand the bio-physical, socio-economic and institutional aspects of groundwater irrigation in the northwest region of Bangladesh. This will be done through intensive monitoring of the groundwater irrigation by STW and DTW in 6 selected sites in Rajshahi, Pabna, Bogra, Rangpur, Dinajpur and Thakurgaon District. The study is expected to provide the answers to the following questions:

- How water and land productivity varies from plot to plot or from location to location and by different modes of irrigation? What are the reasons? How they can be improved?
- What institutional arrangements are in place? What are their effects on the productivity/performance? How they can be improved?
- What lessons can we draw for the sustainable and equitable management of GW resources that may be applicable in Nepal and Bihar?

It is expected that after analysing the data collected from the field in first year (dry season of 2015-16), it will be possible to understand the type of intervention necessary to improve the productivity of water, particularly by reducing pumping of groundwater. In the next year (2016-17), some pilot demonstration of the selected interventions will be tested in the farmers' field. The output of this study is expected to identify and demonstrate technologies to grow more crop with less water which will benefit the farmers as well as reduce the pressure on groundwater use.

Bangladesh Rice Research Institute (BRRI) is leading the field activities of the project in collaboration with CSIRO and University of Southern Queensland of Australia, and International Water Management Institute (IWMI) based in Sri Lanka.

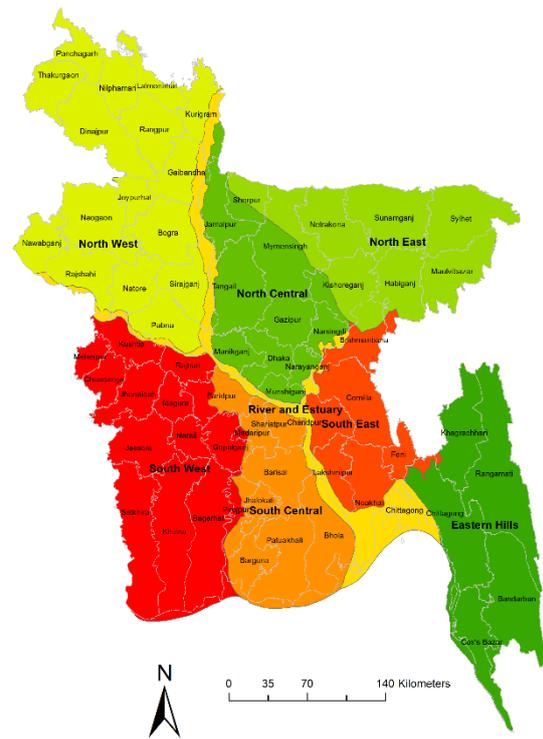


Figure 3 Hydrological regions of Bangladesh with districts names and boundary (off white lines)