

What changed agriculture, how water use adjusted : A case study in Tamil Nadu, India

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Tamil Nadu state is located at the southeastern tip of the Indian subcontinent. Half of the working population of this state are engaged in agriculture. The peak rainfall occurs in October and November by the northeast monsoon, and there is less rainfall in other months because the south-west monsoon is blocked by the Western Ghats. The annual rainfall is less than 1,000 mm at most parts of the state. Tank irrigation systems have been developed since the ancient time to utilize scarce rain water for agricultural production. This study aims to clarify recent changes in crops cultivated, to identify the causes of the changes, and to discuss the sustainable water use systems under the monsoon climate.

Statistical data of Madurai and Virudhunagar districts in Tamil Nadu State, that locates upper part of the Gundar river basin, was collected from state government publications. Village population, tank command area, rainfed field area, well irrigated area and others were mapped using the geographical information system (GIS). Spatial distribution of rainfall was estimated from the weather observation data. In 2006 and 2007, the data of cropping and agricultural water use was collected through the interview to the farmers in the selected villages in this area.

In the 1970s, paddy production in the tank command area and millets production in the rainfed field was dominant in this area. These crops were mainly for home consumption of the farmers. Cash crops like cotton or oil seed crops were planted under rainfed condition, but they occupied only a small part of the total agricultural area. In the 1980s, millet planting decreased, and replaced by pulses partly and fallow mostly. In the 1990s, cotton has been replaced by more profitable crops such as sugarcane, fruits and vegetables. Changes in crops since the 1980's suggest the agricultural transformation from subsistence crops-oriented to commercial crops-oriented ones. The economic liberalization in the 1990s accelerated this transformation.

Market development of commercial crops is undoubtedly the major driving force of agricultural transformation during the last three decades. This forced farmers to adjust their water use for agriculture. First, they need more water because water requirement of most of commercial crops is bigger than those of traditional subsistence crops. Second, groundwater emerged as a new source of water and conjunctive use of groundwater with surface water including rainfall became popular. Third, water-sharing mechanism between upstream and downstream systems was deteriorated, resulting in a big difference in system performance between the water-rich western and water-poor eastern parts of the state.

Flexible water use systems including reallocation of cropped land and migration are suggested to be one of the most effective measures to cope with temporal imbalance in water supply and demand whether it is caused by market development or climatic changes.