Intensification and Extension of Agriculture through Enhanced Water Availability/Access

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Introduction

The increased competition for water in the Western Odisha puts great pressure on the local hydrology and ecosystem. Tank water depletes in three ways, through evaporation, deep percolation and drawl for irrigation, of which: Evaporation cannot be avoided. Percolation of water under the tank bed also cannot be controlled but the surface water lost through percolation can be utilized again as it recharges the groundwater.

There is a high potential for groundwater as a more dependable resource in the command areas of tanks. There is also a good scope to utilize this potential with a high degree of efficiency through integrated and conjunctive use. Groundwater is a very valuable supplementary source of irrigation in-tank ayacuts, where availability of surface water is constrained by monsoon rains.

So, the sustainability of irrigated agriculture is being questioned, both economically and environmentally. The majority of existing irrigation schemes are small, serving usually not more than 200 to 300 households. Many of these schemes are based on stream and river diversions and groundwater wells, while some depend on small dams and perennial springs. Most of the schemes were designed and developed without the consent of the local communities. As a result, many of the small-scale irrigation projects have been operating below expected returns. The sustainability of small-scale irrigation projects depends on (operational) management. Many studies in India focus on technical aspects of irrigation schemes, also limited to conventional surface irrigation mechanism and very little is known of the socio-economic implications of irrigation development utilizing both the surface and groundwater as a synergy. Hence, realizing the need for a better understanding of the socio-economic functioning of stream tank well integration with public-private partnership mode conceptualized an action research project with this irrigation scheme.

Major Objectives

Water scarcity, augmented by deforestation, soil erosion/runoff, and rising demand leading to unsustainable use was identified as one of the major contributing factors to poor agricultural yields in Budapada village of Baduapali Gram Panchayat in Sambalpur District of Odisha in India. Given the nature of monsoon rainfall, the key to meeting the area's growing demand for water for domestic and agricultural use was a major concern. Against this backdrop intervention in the form of **the Budapada check dam** has been able to bring marked changes in the area and so also in the life of 100 families directly in the village. This study was carried out in Jhankarbahali, Budapada, and Tangarjhuri, three small villages with the following objectives:

- To document the technological intervention and find out if there is ensured sustainable water management
- To find out if the local people have a better livelihood option and migration is checked
- To analyse the improvement in the level of freshwater so also groundwater

THE IMPLEMENTED TECHNOLOGY

The technology is very simple and applied mechanics by our traditional farmers from very old times. It is integrating surface water with groundwater i.e. integration of Tank and Well that has aimed at optimal utilisation of the water resources and maximize agriculture production per unit of water. For good agricultural production, the crop must be supplied with a requisite quantity of water at the various critical stages of its growth. Groundwater lifted from wells for irrigation at some cost is better controlled, more productively used and more valuable than that from canals or tanks. With the new agricultural technology, its value has risen considerably.

The integrated use of surface and groundwater can provide the timely need of the plant during the water scarcity at the time crop reaches the sensitive stage. Often the tank storage gets depleted by use, by conveyance and seepage losses and by evaporation and percolation.

Groundwater which is stored in the subsurface is a ready source of irrigation and it provides water according to the needs of the crop. Considering the potential of groundwater resources in the tank command which receives a good replenishment not only from rainfall and tank storage but also from the applied irrigation water,

Groundwater in tank command areas as a common property resource

Treating groundwater in the command areas of irrigation tanks as a common property resource, often seen by the farmers as an attractive short term solution to water stress, which has several major long-term effects. For one, it has reduced the willingness of good irrigators to participate in in-tank maintenance. With a well, they have their source of water although, in fact, in most cases, part or all of the groundwater is due to recharge from the tank itself and a reduced short-run economic incentive to help maintain the tank. Indeed, they even have the short-run incentive of maximizing pumping rates to sell surplus water to their neighbors, often leading to monopoly sale of water. In the long run, of course, they are sawing off the limb they sit on, as degradation of the tank will ultimately affect their well yield. This privatization of common property resources provides a particular challenge to revitalizing village institutions for sustained tank management.

OUTCOME

A post-implementation study came up with some major findings in the area after implementation of the project, that is explained in the following head:

HOUSEHOLDS' INCOME SITUATION AND FOOD SECURITY CONDITION

This study shows that these irrigation interventions increased average households' income compared to before the implementation of these schemes. Irrigation increased crop diversification, cropping intensity from one crop to two or three crops per year, production volume, households' income, and consumption and employment. Access to irrigation water created the opportunity for the households to diversify their income base and reduced their dependence on rain-fed agriculture and livestock. This reduced their vulnerability to the seasonality of agricultural production and external shocks. 70% of the household respondents secured their family food consumption through increased income from irrigation.

EXTENSION SERVICE PROVISION

Horticultural crop production is knowledge-intensive and requires careful crop management starting from nursery to post-harvest handling and marketing. Therefore, education and training of farmers are extremely important. Educated and trained farmers can use information from different sources i.e. folders, posters and information on input packages. In Tangarjhuri most farmers have attended primary and secondary education and this might have contributed to the better field management observed and to higher profits. Moreover, education is an important factor since the entire management is done by the committees elected by its members. In particular financial management (bookkeeping of input prices, input use, yields, and revenue distribution) needs good bookkeeping procedures to guarantee transparency and to avoid possible conflicts. The provision of agricultural extension services in both irrigation schemes is very low.

During field visits, it was also observed that many agronomic practices are according to the recommendations. Plant spacing, the threshold level for applying agrochemicals and the amount of irrigation water are based on farmers' knowledge. The other problem, especially in Jhankarbahali is product marketing. Most of the horticultural growers follow a similar cropping calendar and the seasonality of production results in a high supply of the same product and consequently low prices. About 81% and 77% of tomato and onion around Baduapali are traded at the farm get level, respectively.

CONCLUDING REMARKS

When best practices in enhanced productivity of the agricultural sector this intervention has improved food security. The development of tank stream well integration is one small-scale intervention in irrigation. But it aims at increasing the living condition of local people and has been one important instrument to check seasonal migration in the target area by helping in optimized utilisation of surface water and groundwater.