

the pond. The centrifugal pump and diesel engine for lift irrigation was provided by RRS, Ballawal Saunkhri.

Wheat crop during *rabi* season was raised on residual profile moisture. However, supplemental irrigation to about 3 ha wheat crop was applied at crown root initiation (CRI) and flowering stages during 2012-13 and 2013-14, using lift irrigation with diesel engine pump. The supplemental irrigation enhanced wheat (PBW-175) grain yield by 33 % when irrigations were applied at CRI & flowering stage and 22 % when irrigation was given at CRI stage as compared to yield without irrigation. The B:C ratio with one and two irrigations was 2.41 and 2.60, respectively as compared to 2.02 without irrigation.

During *rabi* 2014-15, due to early withdrawal of monsoon and long dry spell for about 90 days, there was no sufficient moisture for sowing of *rabi* crops. However, there was approximately 3100 m³ stored rain water in the pond at the start of sowing of *rabi* crops. As a result, sowing of wheat with pre-sowing irrigation was possible on about 10 ha land which otherwise would have been left unsown.

For using the water judiciously and creating awareness about water use efficiency, portable sprinkler system was installed as technological intervention. A water user society was formed to regulate the water distribution and use/maintenance of micro-irrigation system (MIS). The society unanimously fixed Rs. 50 per hour for renting engine and contributing diesel for its operation with the condition to revise rates periodically. The generated amount is deposited in the bank account of society.



Irrigation with portable sprinkler system

Promotion of Pisci-culture, Vegetable cultivation

The NICRA farmers were motivated to develop pisci-culture in village pond. With the help of State Department of Fishery about 10,000 fingerlings of three different types of fish (Mrigala, Katla & Rohu) were introduced in the pond to increase the income. Farmers are being encouraged to adopt micro irrigation systems for cultivation of vegetables for enhancing their farm productivity and profitability. AICRPDA scientists coordinate between farmers and state agencies for getting benefit of various state schemes regarding micro irrigation system, soil conservation, promoting horticulture etc.



Release of fish fingerlings in the pond

The renovation of pond completely changed the outlook and attitude of NICRA farmers. Before the renovation of pond, people used to simply broadcast raya/taramira or leave the fields fallow during *rabi* season. Presently, due to water availability farmers are bringing more area under different crops especially during *rabi* season.

Scientists Associated

S.S. Bawa, Sher Singh, Amit Salaria and Sukhwinder Singh

Contact : Phone & Fax: +91 - 1885 - 241607
Email: rrskabs@pau.edu, subhash38@yahoo.com



WATER RESOURCE DEVELOPMENT IN NICRA VILLAGE



Satvinder Singh, S.C. Sharma, Vivek Sharma, Vijay Kumar & Anil Khokhar

ALL INDIA CO-ORDINATED RESEARCH PROJECT FOR DRYLAND AGRICULTURE

REGIONAL RESEARCH STATION FOR KANDI AREA
(PUNJAB AGRICULTURAL UNIVERSITY)
BALLOWAL SAUNKHRI DISTT. S.B.S. NAGAR 144 521 (PUNJAB)

2014

Background

National Initiative on Climate Resilient Agriculture (NICRA) Project was started at villages Achalpur and Nainwan in Tehsil Garhshankar of district Hoshiarpur, Punjab under All India Coordinated Research Project on Dryland Agriculture (AICRPDA) - Ballawal Saunkhri centre. These villages are approximately 35 km from AICRPDA - Ballawal Saunkhri centre on Pojewal - Jhungian road and lies in plateau (*beet* area) of *Kandi* area of Punjab. The villages are located between 31°14.55'N latitude and 76°18.16'E longitude at an elevation of 493 meter above mean sea level. The domain area under NICRA falls in ACZ-1 of North Eastern Punjab known as *Kandi*. The area is characterized by erratic distribution of rainfall, delayed onset and early withdrawal of monsoon resulting in uncertain crop yields. Crop failures are common due to moisture stress caused by dry spells. The frequency of drought in the zone is 1/2 in 5/10 years.

Selected villages and adjoining area is dominated by maize based cropping system. More than 80 % area of the selected site is under rainfed agriculture, having very deep groundwater (water table depth \geq 650 feet). There is potential for water harvesting and its efficient utilization due to sloppy lands resulting in high surface runoff. The existing pond in NICRA village Nainwan was defunct in spite of good runoff from catchment.

Interactive Meet for Problem Identification

The launch workshop for NICRA project was organized in village Nainwan during April, 2011 in which farmers of both NICRA villages (Achalpur & Nainwan) and AICRPDA scientists interacted to discuss the problems of villages particularly related to agriculture. The farmers highlighted that water scarcity is the major problem of villages for crop production. They raised the issue of village pond which was defunct even after the renovation efforts made at different levels with the support of the farming community. After discussion with the farmers it was unanimously decided that with the support of farming community, NICRA project and Punjab State Department of Soil Conservation the efforts will be made to renovate the defunct pond. The AICRPDA scientists along with farmers visited the



Farmers' feedback



NICRA Village Pond (Before Renovation)

whole area to identify the main problems of defunct pond. The scientists came to conclusion that the pond area was too big, heavily infested with weeds & bushes and soil from the pond bed was excavated for brick kiln that lead to heavy seepage losses. Further, a breach in the inlet to the pond enhanced the problem. As a result, majority of the runoff flowed downstream leaving little or no water in the pond. In view of this, AICRPDA scientists decided that pond area to be in catchment - command relationship and runoff.



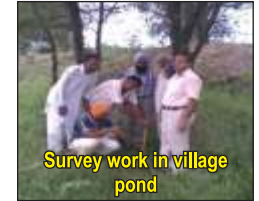
Location of NICRA village Nainwan

Renovation of pond

The survey was conducted by the engineering team of Regional Research Station (RRS), Ballawal Saunkhri to estimate the catchment - command area and potential of rainwater harvesting. The survey revealed that the pond has catchment area of approximately 25 ha and surface area of approximately 1.6 ha. The map along with estimate was prepared for the renovation of pond that got approved from the competent authority.

Following interventions were made for the renovation of the pond:

- Excavation of earth from the pond nearer to the inlet structure and using the excavated earth to divide the pond into four parts
- Excavation of earth for proper inlet channel along with provision of a culvert to divert runoff flowing downstream towards pond and filling the eroded portion adjacent to inlet drop structure
- Cleaning of shrubs, bushes etc. growing in the pond by the villagers



Survey work in village pond



Satellite view of Nainwan village pond

The excavation of earth from pond and inlet channel was executed by the Punjab State Department of Soil Conservation with design and technical guidance of AICRPDA scientists and financial support of NICRA. The culvert for diverting runoff was installed by the Punjab State Deptt. of Soil Conservation.

NICRA Farmers' Contribution in Renovation of Pond

The pond area was prone to snakes and no one was willing for cleaning shrubs and bushes growing in the pond. One farmer voluntarily spared JCB and other his tractor trolley for site clearance and transportation of material. The small farmers contributed in terms of labour for renovation of the pond, thus cleared all the unwanted vegetation. The joint efforts of farmers, state department and NICRA contributed to renovation of the village pond that resulted in water resource development in NICRA village.

Water Availability and Utilization

Storage capacity of the pond was approximately 4500 m³, with average depth of 2.9 m and cost of water was approximately ₹ 0.08 per litre. With reduced surface area, clayey soil and bed compaction reduced evaporation and seepage losses. Further no seepage control measure required at this stage. Evaporation losses can be controlled by providing shade nets, asbestos sheet etc. but their use was not feasible in present scenario. The green algae grow very quickly on surface of water and can be used as feed supplement for milch cattle. Thus green algae were allowed to grow in the pond for checking evaporation of water. The pond was full to its capacity which indicated that installed culvert was able to divert the runoff into



NICRA Village Pond (After Renovation)



Use of stored water with lift irrigation