

## **NCHSE's Engagement with Water Harvesting Initiative**

### **Watershed Management in Kudi village of Madhya Pradesh: A case study**

#### **Background:**

Erratic and low rainfall, low fertility soils, poor infrastructure development, along with high population pressure with low literacy levels are some of the main causes of poverty in rural India. The Government of India (GOI) adopted watershed management as a strategy to make the agricultural productivity in the rain fed areas sustainable.

National Centre for Human Settlements & Environment (NCHSE) was assigned works for management of Amlaha Mili Watershed in Ichhawar Development Block under Rajiv Gandhi Watershed Mission in January 1997 by the Sehore District Panchayat. NCHSE undertook various initiatives including PRA, constitution of Watershed committees, confidence building works, regular meetings to ensure participation of villagers in planning and implementation of need based soil and water conservation works under the project in 3 villages covering Amlaha Micro watershed (1163.32 ha), Bharakhedi Micro watershed (398.97 ha) and Kudi Micro watershed (687.60 ha) during January 1997 and March 2003. The project initiatives were completed under joint supervision of NCHSE and Watershed committees.

Major outcomes of the project were:

1. Improvement in ground water level as well as enhanced availability of surface water during post monsoon period resulting in increase in irrigation potential as well as agricultural productivity;
2. Expansion of cropped area, both in Kharif and Rabi seasons with consequent increase in productivity and cumulative production.

On completion of works in March 2003, assets were handed over to Sehore Zila Panchayat for further development and upkeep.

#### **Post Project Assessment:**

With a view to assess the sustainability of the project implemented over a decade back, the infrastructure facilities created for water and soil conservation in Kudi Micro watershed under the Rajiv Gandhi Watershed Mission were inspected on 5<sup>th</sup> February 2016 as well as information regarding relevance of the project activities on the present context were obtained through interviews with farmers/ beneficiaries including those who were named in the project completion report prepared by NCHSE in 2003.

#### **Description of Kudi Micro Watershed:**

The Kudi micro watershed with total area of 687.60 ha falls under Kankerkheda Panchayat and drained by Utawali River, which originates on the highlands on the North–East of Kudi village. The Utawali River has been dammed at Kankerkheda village on the downstream of Kudi village (Fig 1). Consequently, the Kudi Village and its crop lands falls under non command area.

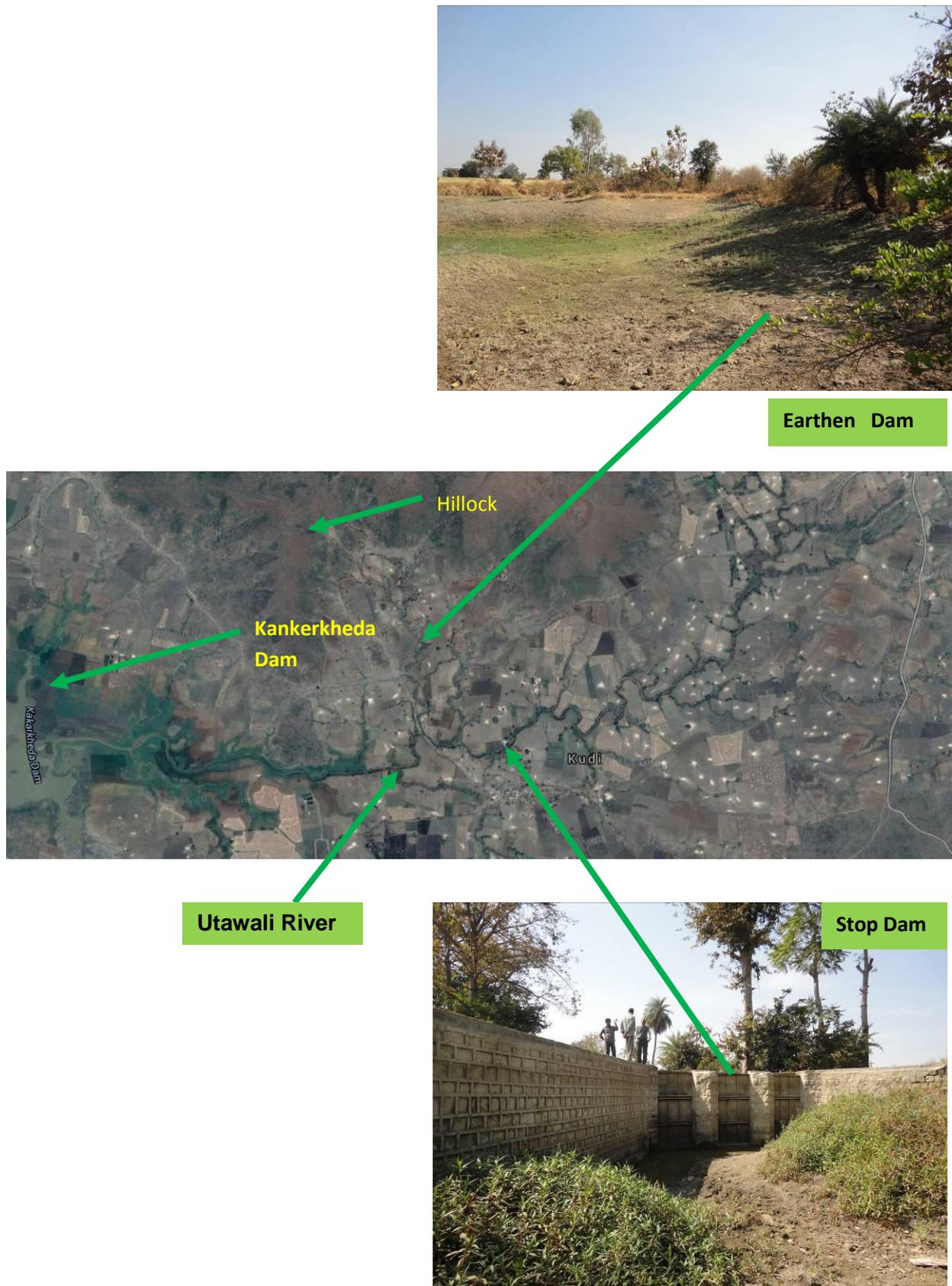


Fig. 1. Development activities in the Utawali River catchment

The area is characterized by moderate rainfall and moderately productive black cotton soil, but lacks assured irrigation facilities. Usually sufficient rainfall enable farmers to grow soybean and maize during monsoon season, but before the implementation of watershed management project by NCHSE during 1997-2003, water scarcity during post monsoon did not allow most of the farmers to grow Rabi crops, which led to low crop output in the area.

#### **Rainfall in the Area:**

The normal rainfall of Vidisha district is 1135.5 mm. It receives maximum rainfall during southwest monsoon period. About 91.4% of the annual rainfall received during monsoon seasons. Only 8.6 % of the annual rainfalls take place during October to May period. The surplus water for groundwater recharge is available only during the southwest monsoon period.

#### **Hydrology of the Area:**

The area has Deccan trap formation and the main aquifer systems comprise the weathered, vesicular flow contacts jointed, fractured zones etc. The ground water occurs mainly under phreatic conditions. During the pre monsoon the water level ranges between 6 – 12 mbgl. During post monsoon water level is shallow. The yield of wells in this formation varies from 1 to 5 lps. Therefore ground water based irrigation prevails. The present stage of ground water development reached 60%.

#### **Watershed Development Works Undertaken during 1997-2003:**

As per PRA exercise, field survey and consultation with villagers, various need based development works were undertaken, which include construction of two masonry stop dams and repair of one complete with gated spillway, 2 masonry Check dams (with crest level spillway), 9 earthen dams, 56 LBS, 10 Gabion and about 700 meter of farm bunding for water resources development as well as water and soil conservation so as to enhance agricultural output in the area. The impact of development works on crop production as on March 2003 as compared to year 1997 is presented in the table below:

Season	Year	Area (ha)	Total crop Production (Qt)	Crop productivity (Qt/ha)
<b>Kharif</b>	1997	215.0	2150	10
	2003	338.0	3380	10
<b>Rabi</b>	1997	107.5	1290	12
	2003	305.0	6100	20

Major outcomes of the project intervention are summarized below:

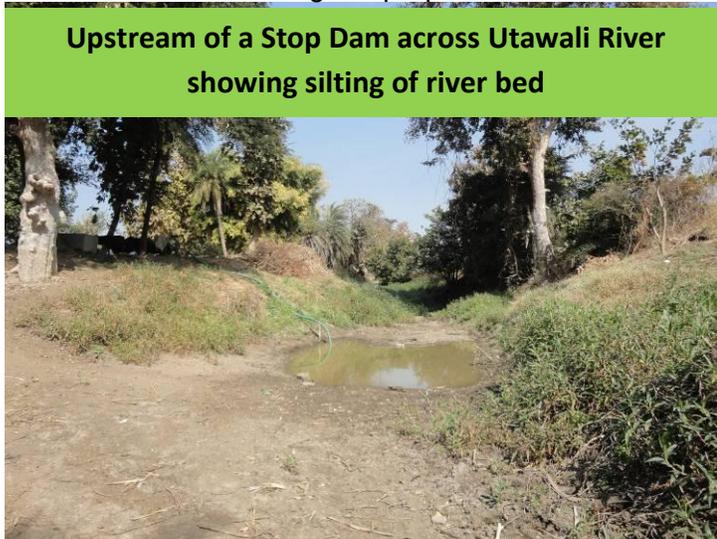
- i. Improvement in ground water level as well as enhanced availability of surface water during post monsoon period resulted in increase in irrigation potential;
- ii. Area under irrigation expanded from 46.4 ha area owned by 9 farmers to 305 ha owned by 90 farmers resulting in 6.6 fold increase in irrigated area and 10 fold increase in beneficiaries;

- iii. Cropped area in Kharif and Rabi seasons increased by 57% and 183% respectively with corresponding increase in total production. The crop productivity in Rabi season registered an increase of 66 %.

**Present Status:**

The Kudi village which is connected to Ichhawar-Sehore road through a 5km all weather road constructed under the Pradhan Mantri Gram Sadak Yojana (PMGSY) has become more prosperous now. Number of households has increased from 90 in 2003 to about 240 now, which include new settlers. On discussion with farmers it revealed that some of the farmers who have earlier migrated to the cities for employment has returned and resumed crop cultivation, which seems to provide better income due to relatively assured water supply for crop cultivation. It was further observed that some of the farmers having crop fields along the river not only could sustain enhanced crop production achieved by 2003, but were able to improve it further. Some of the specific observation other than that mentioned above are as follows:

- i. Enhanced water supply still helping the farmers in growing crops in the Rabi season as well.
- ii. All the water conservation structures created during aforesaid project implementation by NCHSE are still serving its purpose. It was learnt that back waters behind the stop dams/check dams usually are available for irrigation until the month of December. The statement seems true, since during inspection in February 2016 it was observed that despite receiving lesser rainfall in the previous year, the main channel of Utawali River had water in certain



stretches, forming pools which are being used by the farmers for irrigating the riparian crop fields.

- iii. On the upstream of stop dam on the main channel the river bed has been silted at places. However, due to lack of support from the Panchayat, farmers could not take action for the removal of silt from the river bed to maintain the storage capacity of the stop dams.

iv. The check dams are also serving its purpose as a surface water resource for short period after monsoon. However, its relevance in facilitating ground water recharge is quite evident as there are water at a depth of about 3m from ground level in the dug wells constructed just downstream of the check dam.

v. Sections of the masonry structure near the abutment of some of the stop/check dams have been damaged, which needs repair at the earliest to get the benefit for a longer period.

vi. Stability and utility of earthen dams are remarkable. On discussion with farmers it was learnt that water in most of the Earthen Dams were available until mid January. On field inspection it became evident that its utility could further be enhanced/ sustained if soil/silt being deposited each year is periodically removed before the onset of monsoon. Removed soil/silt could be used by the farmers for strengthening the bunds of their crop fields.

vii. Due to financial constraints, farmers could not take up repair of Stop/check dams and desilting of river bed or the earthen dams. At present only the operation of the stop dams are being looked after by some enlightened farmers for the collective benefit. There is willingness among the farmers for regular maintenance of the water harvesting structures. They also expressed desire for technical support for improving agricultural production.

### **Conclusion:**

Kudi Watershed development works induced agricultural practices presents a positive impact on the village community with respect to increase in irrigated cropped area as well as net as well gross agricultural production. This is an example of positive investment enabling improving livelihood of 240 households. However, the impact has now reached the plateau stage and for sustenance of gains, maintenance of infrastructure and introduction of improved agricultural practices are required.

It seems farmers need to strengthen VDCs and to raise funds through contribution from member farmers for the maintenance of water harvesting facilities. However, external assistance is required for capacity building of farmers to facilitate introduction of improved agricultural practices to achieve higher agricultural productivity.

**Dug well down stream of Check Dam**



**Damaged Check dam**