

Importance and benefits of farm pond

construction through farmer's participation: Success stories

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In Malwa region despite the availability of huge amount of runoff, because of satisfactory rainfall amount (average 950 mm) and vertisol area, the farmers experience shortage of irrigation water almost every year. The main reason for the same is dependency of them mainly on ground water. With the enhanced ground water availability due to sufficient rainfall, the farmers of the area cultivate rabi crops with high water demand crops i.e. wheat, onion, potato, garlic etc. simultaneously. Therefore, during December-January month the sufficient irrigation water is not available to the farmer because of lowering groundwater level. These resulted in the unsatisfactory crop production from the farmer's point of view. Simultaneously the water that could be available from the tube well at reduced rate is also not utilized efficiently.

Key words: Groundwater level, Gullies, Run-off water

ALL INDIA Coordinated Research Project for Dryland Agriculture, College of Agriculture, Indore has been carrying out research and extension activities mainly on efficient rain water management through collecting runoff at suitable location in water harvesting tank in the farmers field, for its utilization for irrigating the adjoining crops.

Based on the experiences from above study, the project team has accessed that it is a general hypothesis prevailing in the area that the farm pond can be constructed by medium and big farmers because of this, a piece of land and huge investment are required. Therefore, it

is not economically beneficial for small farmers. To prove this hypothesis invalid, the project team constructed five water harvesting tanks in village Ningnoti and Bisakhedi through participatory approach during April-May of 2018-19 under NICRA project. Through the project JCB machine was made available to each farmer for specific hours based on the requirement and size of the tank. The farmer also engaged dumpers at their cost for the same hours for transporting and spreading the excavated soils in their field to make it level, even and uniform. The details of these tanks are given in Table 1.

Raju Upmanyu, Bisakhedi

Before the construction of tank, due to uncontrolled runoff movement, the field of Raju Upmanyu was fragmented because of development of serpentine shaped gullies and it was impossible to cultivate the field effectively for last 15 years. The several parts of his field were not even cultivated due to these gullies. To tackle these problems, a farm pond was constructed for runoff water collection in 2018 and the excavated soil were spread into these gullies and different portions of the field. These help to reclaim the gullied portion and allow development of a new leveled,

Table 1. Details of new tanks constructed during 2018-19.

Farmer's Name	Village	Tank Dimension (m)				Depth	Capacity (m³)	Land holding (ha)	JCB hrs provided from project
		Top		Bottom					
		L	W	L	W				
Goutam Singh	Ningnoti	21.5	14.5	15	9	4	893.5	4.25	80
Abhay Singh	Ningnoti	15	11	11.2	10.3	4.5	630.81	0.87	80
Ishwar Singh	Ningnoti	57.5	15.5	53.5	11.5	2	1506.5	5.00	110
Raju Upmanyu	Bisakhedi	33	11	29.7	6.3	2	550.11	3.00	80
Pawan Choudhary	Bisakhedi	26	14.5	17.5	15.6	2.7	877.5	4.25	50

uniform and even field, suitable for cultivation. This way, not only the availability of irrigation water got enhanced but also the fragmented field was converted into a suitable, crop producing and income-generating source during 2018-19. Due to sufficient rainfall amount and proper distribution, no irrigation was provided to *kharif* crops from the stored water and therefore it was used in *rabi* season. Before the construction of tank, though soybean was planted in fragmented pieces of the land. The prospect of *rabi* crops was negligible in those gully affected areas. However the tank constructed and use of the excavated soil for reclamation, allowed not only production of soybean but also in the first year itself, bumper production of wheat and chickpea was obtained through efficient rainwater and tube well water management.

The stored rainwater in the tank was used as an additional irrigation to adjoining field as pre sowing irrigation. The empty tank was filled with tube well water, which was providing water at reduced rate on daily basis. The stored tube well water was then pumped with high capacity pump to irrigate the fields efficiently to save labour, time and expenditure. This process was repeated several times during and before, providing irrigation to the crop. This way the limited water of tube well was efficiently and effectively utilized after storing in the water-harvesting tank.

Pavan Choudhary, Bisakhedi

In the field of Pavan also a water harvesting tank was constructed through participatory approach in May 2018 by providing JCB for 50 hrs. The excavated soil was spread in adjoining fields and the productivity and fertility was enhanced, by improving this result not only storage



of huge amount of runoff water in the tank but also produced higher yield of soybean through soil and water conservation activities. With the conjunctive use of stored water and limited ground water, the farmer generated huge income and benefit by producing chickpea from these modified and improved field, which was otherwise impossible.

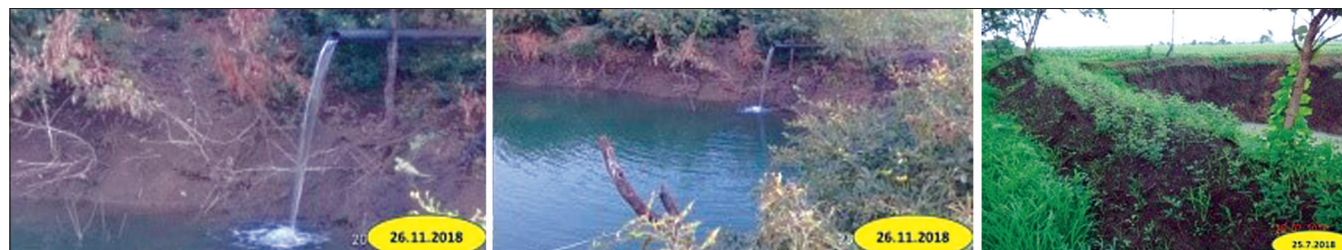
Ishwar Singh, Ningnoti

In 2018-19, a water-harvesting tank was also constructed through participation process by providing JCB for 110 hrs in the field of Ishwar Singh. Like others the excavated soil was spread in to washes and water ways in the field to provide them uniform and even shape and to make it leveled. Due to this, excavated tank got filled up to the brim and controlled runoff water fully recharged the soil profile. This was mainly because of higher time of concentration and safe disposal of runoff due to reshaped and improved fields. Even field condition allowed uniform germination of soybean

throughout the field during first year itself. Ishwar Singh utilized the stored water during *rabi* season and also used this as storage tank for filling tube well water for its subsequent utilization to irrigate the *rabi* crops and save time, money and labour.

Goutam Singh, Ningnoti

The site of the tank was so selected that it can collect the runoff water coming from the village Panod and after the storage, the excess runoff can be safely discharged through its natural way like before. Normally the soil of the field is homogenous but little bit heterogeneity may cause higher percolation from the water harvesting tank, due to existence of sand layer. The percolation rate was higher from the tank of Goutam Singh. However, the construction of this tank allow higher amount of water for ground water recharge at the same time it saved the soil erosion process and development of washes in the lower field due to reduced runoff water amount and



velocity. Simultaneously, it was observed that the percolation rate was appreciably reduced after each refilling of the tank with runoff water. Farmer used this tank as storage tank for tube well water and use this water for irrigating wheat, gram, onion, garlic, ginger etc. Farmer also used drip for the first time that were provided from project side. For this purpose, he purchased and utilized

filter, valve, main line and pump from his side. The immediate experience was also fruitful.

Abhay Singh, Ningnoti

Despite realizing the benefits of having water-harvesting tank, a small farmer does not wish to construct it by sparing a portion of his land and expenditure. However getting motivated from the success of tank constructed by N I C R A (Balus Singh, 2011 and Dharmendra and Prakash, 2012), Abhay Singh contacted the project team in 2018 and requested for providing technical help and guidance for the same. Since Abhay Singh is

having only 0.87 ha cultivated field, the project team selected a portion where lesser amount of area is required for construction of tank and which can be deepened, and collect sufficient tube well water safely as per the requirement. The site of the tank was so selected that common inlet and outlet can be provided which will not only allow safe entry of the runoff water into the tank but also will drain it safely. This work was also carried out based on participation in which JCB was provided for 80 hrs and farmer also engaged dumpers for the same time for transporting and spreading the excavated soil to make it uniform and even. The bunds of the tank were utilized for producing pigeon pea, cowpea, ladyfinger etc for his own use and to earn an additional income. During *kharif*, Abhay Singh planted soybean, maize fodder and coriander which were not provided any irrigation. Since this tank got filled in September, the stored water was utilized by using

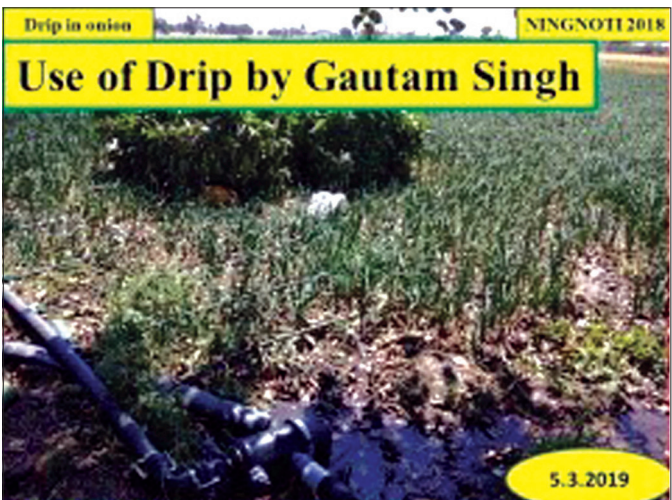
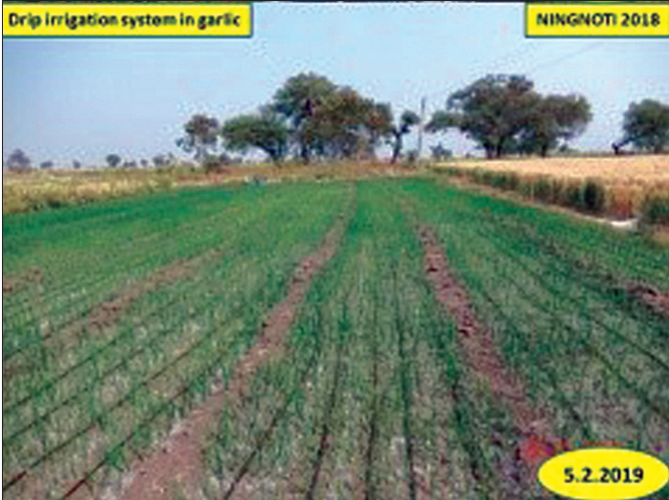


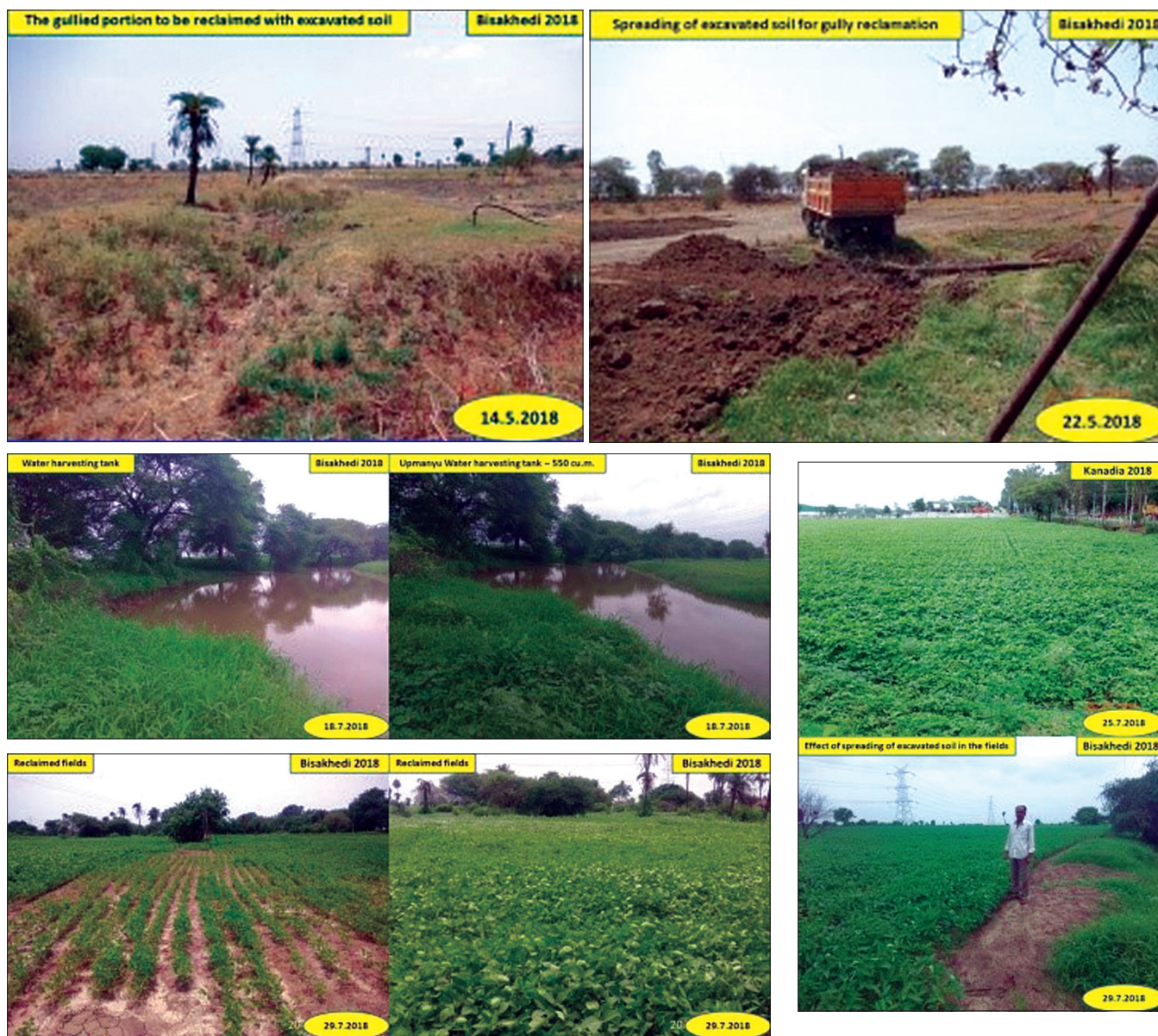
Table 2. Benefits of these tanks (2018-19)

Particular	Before the tank construction	After the tank construction
Storage of tube well water	Not possible	Possible
Excess runoff water storage	Not possible	Possible
Conjunctive use of surface and ground water	Not possible	Possible
Soil fertility	Decreased	Enhanced
land Leveling	Undulation	Leveled field
Life saving irrigation during prolonged dry spells for <i>kharif</i> crops from stored water	Was not possible	Possible
Investment for tube well	Lot of amount	Nil
Recharging of nearby open wells and tube wells	Never recharged and had lesser water	Fully recharged and have sufficient water
Soil erosion	Continued	Reduced and controlled
Arable land area	Less due to undulation	Increased due to leveling
Successful <i>rabi</i> crop production	Not possible	Possible
Treatment of gully affected field	Not possible	Possible
Crop diversification	Not possible	Possible
Income of farmer	Fixed	Enhanced
Amount of runoff water flowing out of field	More	Reduced

5HP submersible pump for irrigating *rabi* crop immediately. This empty tank was refilled with tube well water many times, since than stored water was made available for *rabi* irrigation. Since the tubewell water is available at reduced rate, irrigation with it directly in the field requires more labour, time and expenditure. However, it is easier and convenient if it is collected in the tank and utilized for irrigation with pump having higher capacity. Abhay Singh experienced that earlier 3 days were required for irrigation directly but now the irrigation process is completed only in 10 hrs which ultimately saved labour, time and expenditure. He produced wheat, chickpea, potato, onion, garlic, coriander, mustard and fodder and earned a handsome income. In this way the hypothesis that tanks are

Table 3. Details of area and production under *kharif* and *rabi* crops before and after tank construction in first year itself (2018-19)

Farmer's Name	Village	Land holding (ha)	Kharif crop			Rabi crop		
			Crop	Area (ha)	Production (q)	Crop	Area (ha)	Production (q)
Goutam Singh	Ningnoti	4.25	Soybean	4.22	70.00	Wheat	2.50	110.00
						Onion	0.25	52.00
						Chickpea (Desi)	0.47	5.00
						Chickpea (Dollar)	1.00	15.00
			Area under irrigation during rabi increased by almost two times					
			Area under wheat and onion increased by 0.5 ha.					
			Field washes were filled up with excavated soil to make cultivated field uniform and even.					
			Production of vegetables, pigeon pea, cowpea etc was possible for daily use on tank bunds.					
Abhay Singh	Ningnoti	0.87	Soybean	0.50	8.00	Wheat	0.25	15.00
			Coriander	0.25	10.00 (green)	Onion	0.25	54.00
			Chari	0.10	For cattle	Garlic	0.15	13.00
						Chickpea (Dollar)	0.20	3.00
			Area under wheat, onion and garlic enhanced.					
			Area under chickpea reduced.					
			Field washes were filled up with excavated soil to make cultivated field uniform and even.					
			Production of vegetables, pigeon pea, cowpea etc was possible for daily use on tank bunds.					
Ishwar Singh	Ningnoti	5.00	Soybean	4.90	62.00	Wheat	1.50	65.00
						Garlic	0.50	36.00
						Chickpea (Desi)	1.65	15.00
						Chickpea (Dollar)	1.25	12.00
			Area under wheat, onion and garlic enhanced.					
			Area under chickpea reduced.					
			Field washes were filled up with excavated soil to make cultivated field uniform and even.					
			Production of vegetables, pigeon pea, cowpea etc was possible for daily use on tank bunds.					
Raju Upmanyu	Bisakhedi	3.00	Soybean	3.00	46.00	Wheat	2.25	110.00
						Chickpea (Desi)	0.75	10.00
			Area under soybean, Chickpea and wheat enhanced due to reclamation (0.12ha).					
			Area under irrigation enhanced by 1 ha.					
			Tank constructed in gullied portion.					
Pawan Choudhary	Bisakhedi	4.25	Soybean	4.21	58.00	Wheat	2.00	90.00
						Chickpea (Desi)	0.21	2.00
						Chickpea (Dollar)	2.00	20.0
			A sizable area leveled and saved from further erosion.					
			Area under wheat irrigation increased.					



beneficial for bigger farmers only, was proved wrong. It is also proved that small farmer can construct tank, through which they can produce different crops and additional income. Abhay Singh also utilize drip irrigation system after the enhance water availability and arranged pipe, filter, valve and pump from own side.

The experiences gathered from the construction of these five water harvesting tanks through participatory approach under NICRA during 2018-19 suggested that the construction of tanks not only beneficial to bigger farmers but also helpful to enhance productivity and farm income to small farmers who construct the small sized tanks even in a smaller portion of their fields. All these tanks not only provide supplemental irrigation water but

also collect the tubewell water to serve as storage tanks for providing irrigation at higher rate (using bigger pump submersible pandoobbi pump) than tubewell water to save labour, time and expenditure. Storage of tubewell water in these tanks provide it's subsequent use for irrigation with higher rate for better rainwater and irrigation water management. The excavated soil available during the construction of these tanks can be spread in the uneven and eroded fields to make them uniform, leveled and more fertile for increasing productivity. The gullied portion of the fields can also be reclaimed using the excavated soil to make these suitable for cultivation of *kharif* and *rabi* crops. With the enhanced availability of irrigation, farmers also got convinced for its efficient

utilization by micro irrigation. They also adopted drip irrigation system and used it for irrigation onion and garlic crop for the first time. With the success and advantages of theses tanks in the very first year, the farmers are overwhelmed and motivating other farmers to adopt this technology. It is a perfect example of coordination between scientists and farmers. The surprising and encouraging results and impacts of these tanks, proved the hypothesis wrong that the construction of water harvesting tanks is not professionally beneficial to the small and marginal farmers but only to large and big farmers.

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