

# Integrated Land and Ecosystem Management of Sindh River Catchment Area

Surendra Kumar Gupta

Department of Fisheries, M.P. Govt. Ujjain (MP), India  
Ex Project Officer & District Project Manager Zila Panchayat, Vidisha (MP), India

**Abstract:** *Integrated land and ecosystem management of river revival project is a multipurpose project of Sindh River. The catchment area of the river is 16283 hectare meter and selected length is 22 km which is spread in 23 villages of 7 GP's and one Nagar Panchayat Lateri (Town area) at Lateri block in Vidisha district of Madhya Pradesh. Effective results have been seen such as the availability of enough water in hand pumps, bore wells and other water bodies in the catchments area of Sindh River. This is due to the increased availability of water resources, diversified cropping pattern including cultivation of labor intensive fisheries ponds, vegetable crops and other horticultural crops (Reddy et al, 2004).*

**Keywords:** MGNREGA, Watershed, Water Budget, River Revival

## 1. Introduction

Ground water is the main source for drinking and irrigation in the Vidisha district. About 75% of irrigation in the district is from ground water, though the level of irrigation in the district is very low, only 25.5% of total geographical area is being irrigated. Optimum utilization of MGNREGA funds in rain fed area; the projects are to be prepared on watershed approach with ridge to valley concept. Integrated land and ecosystem management of Sindh river is carried out under IMP (Integrated Micro Plan) which is funded from Mahatma Gandhi National Rural Employment Guarantee Scheme and conversant schemes to provide livelihood in the field of agriculture, fisheries, horticulture, forest, panchayat & rural development, veterinary, livestock, dairy, rural industries, gramudyog, co-operative, resham culture, water resource development and development of SC/ST, OBC. This plan is aimed to motivate, organize and involve the local community to manage all types of available resources of village at their own level. Micro level planning ensures community participation, optimum use of available natural resources, management in substantial and cover river revival area, fresh water flow during lean period in the river structure, year round down stream flow of adequate and reasonable quantum of water.

Participatory management has been defined as a process "which aims to create a self-supporting system, which is essential for sustainability" (Wani et al, 2005). The objectives are soil conservation, improving the land productivity and promoting appropriate technologies for efficient and sustainable use of natural resources. However, many watershed projects around the world have not performed well because of the poor community participation (Johnson et al., 2001). The general topography of catchments area is faller and alluvial soil is available along the catchments. The existing soil is highly prone to corrosion hence there is very high probability of siltation of river. Planning in the traditional system was often based on the capacity of land rather than needs and capacities of local people (Rhoades and Elliot, 2000). But now the priority is given to the needs of inhabitants. Recharging of ground water can be done by constructing hydraulic structures.

## 2. Literature Survey

The project is concerned with realization of the full benefits of Sindh River, block Lateri district Vidisha (MP) India. This project is essentially people-centered and it incorporate good practices from Gram Panchayat, Govt. departments and NGO, such as awareness raising, bottom-up planning, partnerships with Gram Panchayat, Govt. departments and NGOs, and community participation. IMP and River revival project with selected areas of 16283 hectares constitute agricultural land 9602 ha, non-agricultural land 2283 ha, other land 506 ha and forest land 1539 ha. The numbers of villages benefited by the project are 23. This project includes app. 22 km long river benefitting 2655 families. The budget of project is 5920.68 lakhs (By MGNREGS), Rs.929 Lakhs (by the convergence from department of agriculture, Horticulture, PHE, WRD, forest and RES) for the time period of 3 years. On the bank of Sindh River, the project includes 117 population of ST, 3070 population of SC and other castes includes 10092 people respectively.

Against open grazing and felling of trees and voluntary labor for community welfare and other measures which helped in restoring natural resources base of the village (Kerr et al, 2002). It is now widely accepted that the communities must participate to enhance the productivity of natural resources in a sustainable fashion (Turton et al, 1998).

## 3. Problem Definition

Number of Households who were issued job cards and Cumulative Person days generated in 2013-14 for different castes are shown in Chart 1 and 2 respectively. Progress of the works was very slow. As per chart 1 and 2, enough labor is not available and work is pended for many years.

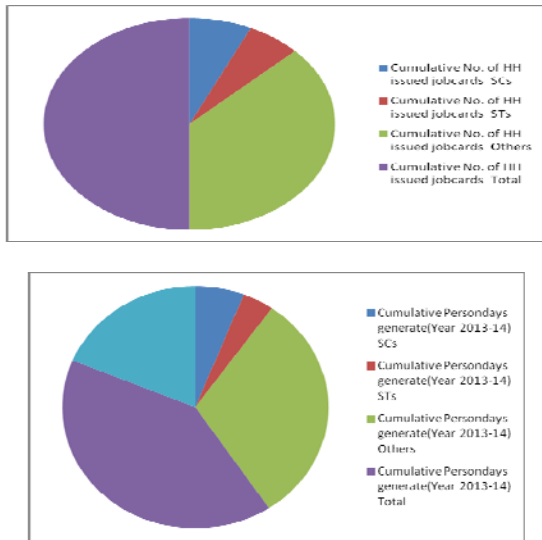


Figure 1: Issued Job Cards of Household Chart 2: Cumulative Persondays Generate (Year 2013-14)

4. Methodology / Approach

Nagar Panchayat and village wise SYI, Micro watershed code, catchment area, average rain, water budget and early constructed water body and estimated water budget and proposed works are shown in Table 1 & 2. Further discussion is given below.

- SYI of 9331071 and micro watershed code 2C3D5W1 - 2C3D5W5, 2C3D5V1 - 2C3D5V5, 2C3D5U2 - 2C3D5U
- Flood discharge is given by Dickens formula  
Dickens formula :  $Q = CM^{3/4}$   
Where Q = Maximum flood discharge  
M = Catchment area  
C = Dicken Coefficient. Its value in M.K.S. varies from 11 to 25
- The project includes work plans in Table 2 (with their respective targets in numbers) to be completed in 3 years.
- Since the strata of Sindh river is rocky. Bearing capacity of rocks is less than required so there is need of special designs.

Table1: Estimated

	Construction As Per	Water Budget	
Average water collected from rain (rain1070 mm)	Total water availability	Early constructed structure hac.metre	Estimated construction hac.metre
2317.62	1158.81	2.72	1156.09
1174.86	587.43	9.94	577.5
866.7	433.35	1.72	431.63
845.3	422.65	1.8	420.85
1182.35	591.18	3.63	587.55
1792.25	896.13	1.44	894.69
1088.19	544.1	1.36	542.74
620.6	310.3	5.99	304.31
955.51	477.76	3.23	474.53
1046.46	523.23	15.04	508.19
459.03	229.52	2.81	226.71
573.52	286.76	6.42	280.34
757.56	378.78	5.08	373.7

1266.88	633.44	1.68	631.76
814.27	407.14	5.45	401.69
792.87	396.44	6.5	389.94
868.84	434.42	2.45	431.97
17422.81	8711.41	77.25	8634.15

Table 2: Proposed River Revival Works

S. No.	Name of works	Proposed works			Financial		
		Unit	Quantity of works	Expenditure (in lakhs)	Quantity of complete works	Expenditure (in lakhs)	Expenditure by public share (in lakhs)
1	2	3	4	5	6	7	8
1	On Govt. land Contour bolder wall and in private land farm wall	Running meter	61904	140.31	12	1.00	0
2	Sock pit	Number	588	32.96	0	0.00	0
3	Underground dike	Number	141	23.45	11	1.65	0.1
4	Recharge of wells	Number	110	67.26	0	0.00	0
5	Recharge of hand pumps and bore wells	Number	45	4.74	0	0.00	0
6	Fish ponds	Number	71	31.66	5	1.20	0.2
7	Bolder/soil/ check dams	Number	179	10.04	0	0.00	0
8	Cemented stop dams	Number	1333	55.68	0	0.00	0
9	Bori bandhan	Number	340	22.64	0	0.00	0
10	Fish tanks	Number	8	27.50	0	0.00	0
11	Repairing of old nala/stop dam	Number	60	108.94	17	0.00	0
12	Repairing of old tanks/ponds	Number	98	93.17	1	0.40	0.1
13	repairing of old wells	Number	192	135.69	4	1.00	0.2
14	Plantation	Hactare	56	9.80	0	0.00	0
15	Other works	Number	332	54.48	0	0.00	0

5. Results and Discussions

River revival and IMP project is expected to provide following results after completion

- Increase in ground water level by 1-2 m.
- In Sindh River, surface flow and sub surface flow is expected to be available up to January.
- Min. calculated water budget in the village Mubarkpur is 229.52 ha m.
- Maximum calculated water budget in the village Gopitalai is 1158.81 ha m.
- Total calculated water budget of the project is 8711.41ha m and early constructed water body is 127.11 ha m.
- Expected water conservation capacity in total is 1789.73 ha m.

Several useful studies have been conducted to assess the contribution of participatory watershed programs (Turton et. al, 1998, Kerr et. al, 2002, Wani et. al, 2005, Joshi et. al, 2003 and Reddy et al., 2004). Many farmers in the watershed development area reported an increase in soil moisture level (Shah, 2001). This improved soil moisture will open new opportunities for diversifying farming activities in rain-fed areas. Many studies have revealed that watershed development interventions were successful in

controlling soil erosion. (Kerr et. al, 2002) .This effect was more significant in case of rain-fed areas as dry lands are more prone to erosion compared to the irrigated lands. Soil and water conservation measures adopted in the watershed development projects were helpful in augmenting water storage capacity and improving local water resources by reducing the rate of runoff, and increasing the ground water recharge. (Butterworth et. al, 2001).

## 6. Conclusion with Future Scope

- Availability of almost 700 ha extra land for agriculture.
- 2-3 rotations of Rabi and Kharif crops in 700 ha agricultural land.
- Establishment of eco-zone by foresting in 970 ha of project land.
- Creation of 2.41 lakh cumulative mandays'.
- Decrease in migration rate.
- Insurance of life saving irrigation in 3000 ha area of kharif cropping.
- Enhancement in water related facilities of 2655 families of 23 villages and drinking water facilities of their 11000 animals.
- Exaltation in agricultural production by 10 to 15 percentages and intensive cropping by 12%.
- Raising farm income, enhancing agricultural productivity, soil and water conservation, generating rural employment, reducing risk by diversifying crops in rain fed areas.
- Increase in ground water level by 1-2 m.

## References

- [1] Butterworth, J., Reddy, M.Y.V. and Batchelor, C., "Addressing water needs of the poor in watershed management". Internetsite:<http://www.nri.org/WSSRM/Reports/water%20needs%20in%20watershed%20management.doc>.
- [2] Johnson, N., Ravnborg, H.M., Westerman, O., and Probst, K., "User participation in watershed management and research", working paper no.19, CAPRI, IFPRI, Washington, D.C., 2001.
- [3] Joshi, P.K., Tewari, L., Jha, A.K. and Shiyani, R.L., "Impact of watershed program and people's participation". National Centre for Agricultural Economics and Policy Research, (NCAP), New Delhi, India, 2003.
- [4] Kerr, J., G. Pangare and V.L. Pangare. Watershed Development Projects in India: An Evaluation, 2002. Washington, DC: International Food Policy Research Institute (IFPRI), internet site: [www.ifpri.org/pubs/abstract/abstr127.htm](http://www.ifpri.org/pubs/abstract/abstr127.htm).
- [5] Reddy, V.R., Reddy, M.G., Galab, S., Soussan, J., Baginski, O.S., "Participatory Watershed Development in India: Can it Sustain Rural Livelihoods"? Development and Change 35(2): 297-326.2004.
- [6] Rhoades, R.E., and Elliot, T.S., "Participatory watershed research and management: where the shadow falls". Gatekeeper series no.81, London: International Institute for Economic Development (IIED).2000.
- [7] Shah, A., "Who benefits from participatory watershed development? Lessons from Gujarat, India". Gatekeeper series no. 97, London: International institute for Economic Development (IIED). 2001.

- [8] Turton, C., Coulter, J., Shah, A. and Farrington, J., "Watershed Development in India: Impact of the 1994 Guidelines". A report prepared for Government of India (GOI) and DFID (New Delhi). London: ODI. 1998.
- [9] Wani, S. P., Singh, H.P., Sreedevi, T.K., Pathak, P., Rego, T.J., Shiferaw, B., and Iyer, S.R., (part3/case examples/ case 7). "Farmer-Participatory Integrated watershed Management: Adarsha Watershed, Kothapally India. An Innovative and Upscalable Approach". Case 7 in part 3 case example series, ICRISAT, India. 2005.

## Author Profile



**Surendra Kumar Gupta has done** B. Sc, M.Sc (Organic Chemistry) from Government Maharaja College Chhatarpur, PhD in Environmental biology (Life Science) and diploma in Russian Language from APS University, Rewa (MP). He has done DAMS from Hindi Vishwavidhyalaya , Allahabad. He is Ex Project Officer and District Project Manager in Zila Panchayat at the Vidisha, Rewa and Sidhi. Ex Field Officer INDUS labour project (ILO project) and NVDA. Currently he is posted in department of fisheries, govt. of MP at Ujjain (MP) India. He has 24 years industrial and research experience in the field of medical, life science, watershed and rural development.