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Research Paper

Rainwater Harvesting through Check Dams for Integrated Watershed Management in Karkara Basin: A Geographical Analysis

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ABSTRACT

Water is one of natural resource, which is put to variety of used. India being an agrarian country depends a great deal on water for production of food and economic development of the rural area. So rain water harvesting through Check Dams is a very important component of the integrated watershed management programmes. Rain water harvesting is the management of rain runoff involving harvesting of excess rain falling on land surface by creating a storage facility by Check Dams. Community based rain water harvesting of the yore has proved much beneficial today. The watershed development projects have to succeed and sustain, land and water conservation should emerge from felt need of the land holders and village community. Run off harvesting by Check Dams is the key to the development in the study area because the topography of the area is undulating and the annual rainfall usually varies from 1000 mm. to 1500 mm., about 82% of which occurs during rainy season. There is a serious problem of sheet and gully erosion in the plateau area of Jharkhand in which the study area is located. The major Dams constructed by the D.V.C. in the plateau area are seriously affected by siltation due to this problem. There is acute water shortage in the non monsoon month due to lack of technological intervention of water management technique.

Keywords: *Watershed, Management, Harvesting, Reservior, Conservation*

Objective

The main aims and objectives are to analyse the role of Check Dams for runoff harvesting under integrated Watershed Management Programme in Jharkhand in general and the upper Damodar Basin in particular.

Study Area

The study area comprises of Karkara watershed in Itkhori Block in Hazaribag district. It is the tributary of Barakar river (Tilaiya Catchment). It extends from 24°14'45" north to 24°18'15" north latitudes and 85°13'45" east to 85°16'5" east longitudes (Fig.1 & 2).

The watershed in 45kms. from the city of Hazaribag with an area of 1751 hectares, has a representatives topography and is mostly populated by economically depressed sections of

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the society. The watershed is drained by a single main channel known as Karkara Nallah. The area needs of Soil Conservation Programme because as a representative area of D.V.C. The tracts suffer from high to moderate erosion. Due to severe erosion problems, the Soil Conservation Department of D.V.C. is carrying out the integrated protection of Soil by various methods including Check Dams. For this purpose, three cheek dams have been constructed namely Larahi, karkara and banha on Karkara Nallah (Fig. 2).

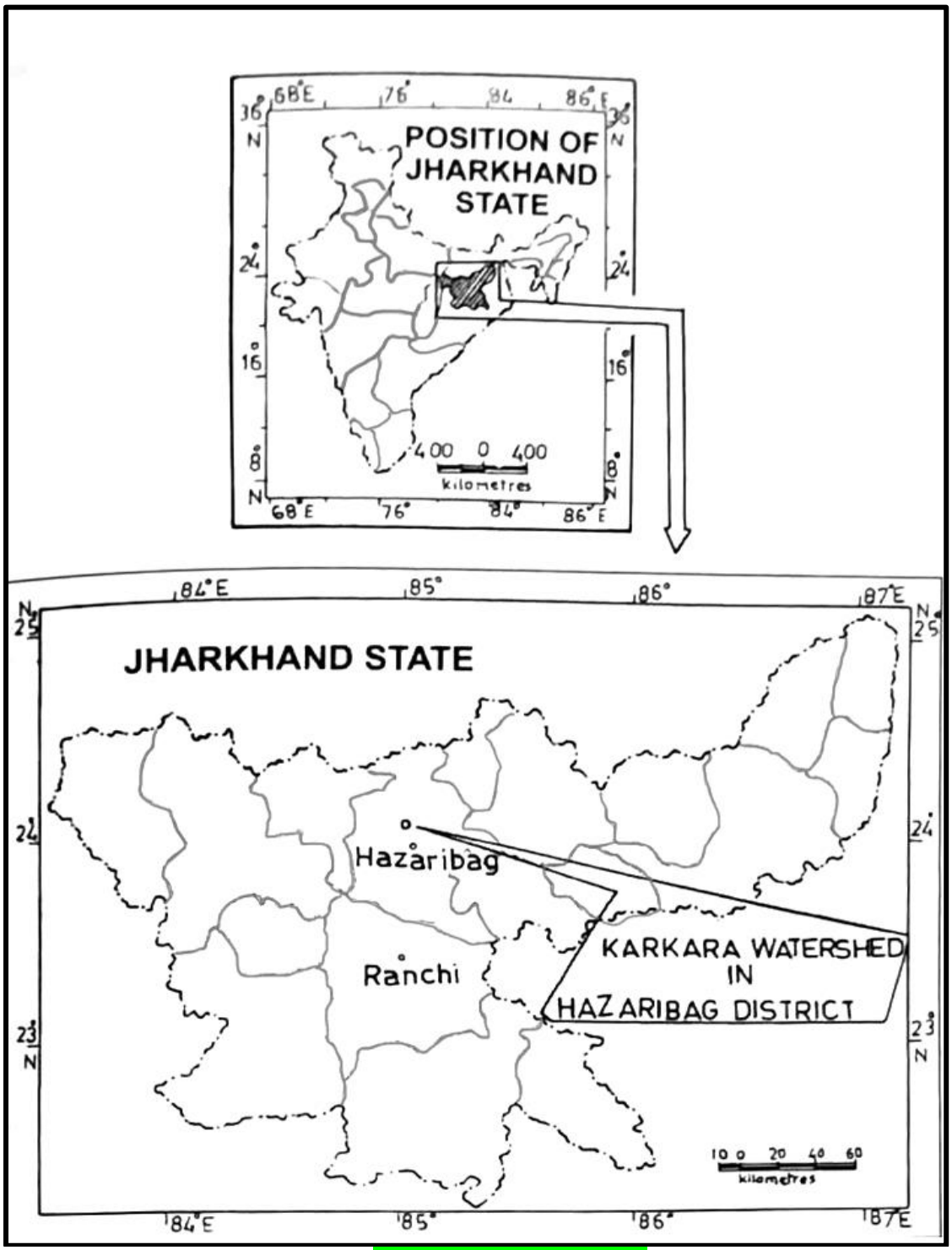

Fig. 1 Add Figure name

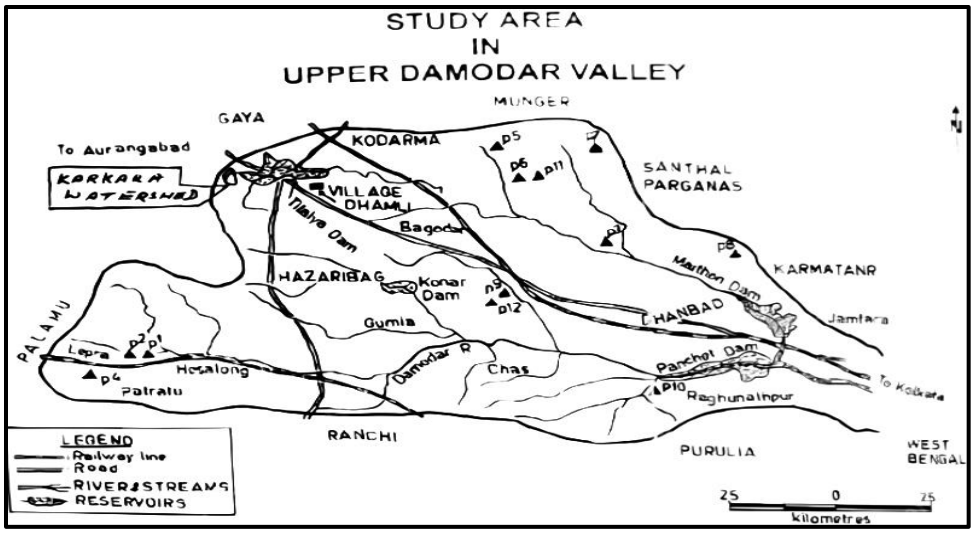

Fig. 2 Study Area in Upper Damodar Valley

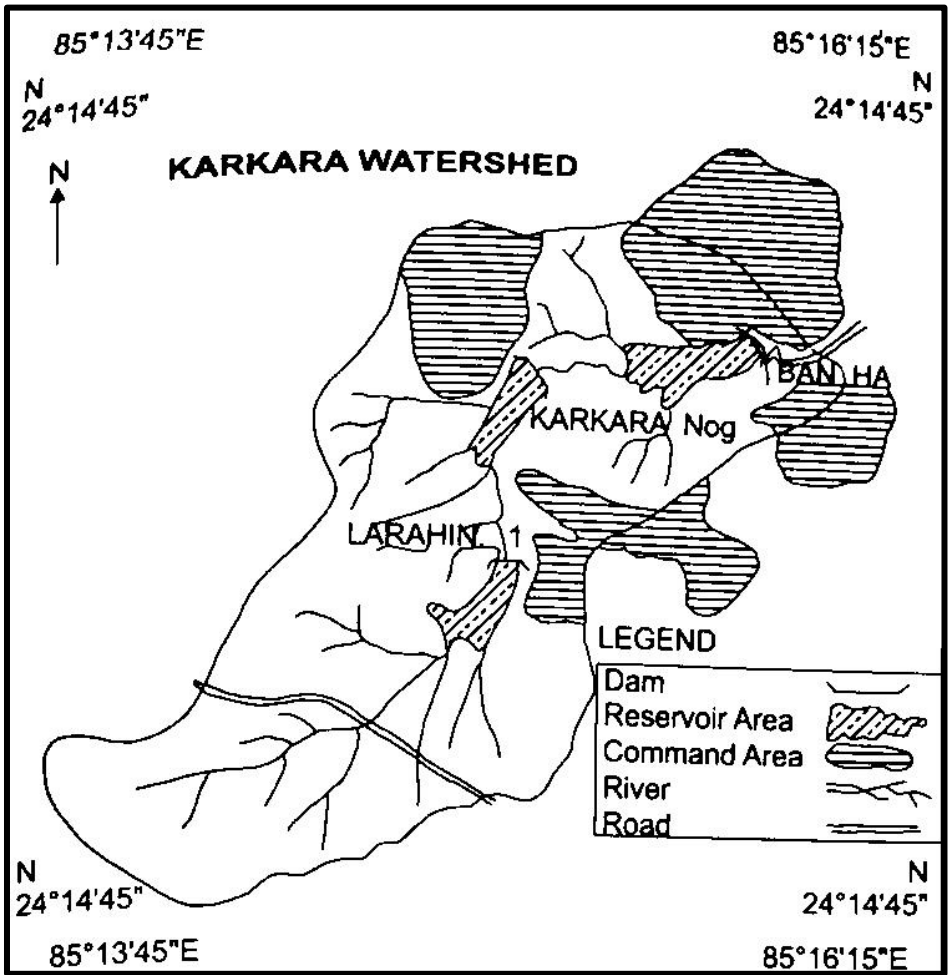

Fig. 3 Karkara Watershed

Watershed Management in The Area

A watershed refers to the catchment area of a stream, channel or a river. It is a natural hydrologic entity and involves definite geographical area clearly bounded by a water divide. The source of water is rainfall. The size is few hectares.

Suitability of watershed as unit of development is because land and water resources are interdependent with in a watershed. Problems within the watershed generally also have their sources within the watershed. Hence watershed is an ideal unit for planning development

Watershed management broadly aims at judicious use of basic resources of soil and run off harvesting and achieve sustained optimum production in a ecologically friendly manner. The term is almost synonymous with soil and water conservation. Watershed management programme involve project type operations developed and applied to all the land and water in a specific watershed, taking into consideration the physical condition, needs and problems of watershed, its relationship to the larger watershed etc. The ultimate purpose is to improve the economic and social well-being of the people of the area in particular.

Aims of Runoff Harvesting under Integrated Watershed Management Programmes

Following are the main aims of the watershed management programmes:

a) The main aims of the Watershed Management Programme is to conserve and improve the soil and water resources of the area for more efficient production. This will include the use of the land as per its capability, introduction of anti erosion practices on agricultural land, more efficient cropping rotations suited to the area, improved range management and effective forest management including the afforestation of denuded area. Management of the degraded land is of the prime importance since due to lack of economic returns it is uncared and goes on deteriorating.
b) Due to runoff harvesting water resources of the basin are to be developed for providing irrigation, pisciculture. Ultimate aim shall be to reduce damaging overland runoff and improve the water regime of the area.
c) Use of electricity is to be encouraged for industrial development in the area and at the same time to reduce the pressure on forests of the basin.
d) Agricultural extension services to be organised for evolving the most productive crop rotations, introduction of improved seeds, judicious use of fertilizers adoption of anti erosion practices etc.

Integrated Watershed Management Programme and Check Dams for Runoff Harvesting

Due to very severe erosion problems the soil conservation department of Damodar Valley Corporation is carrying out the integrated watershed treatment which includes protection/ regeneration of forests, in situ moisture conservation, gully control by various methods, check dams, monitoring of works by silt and run off observation, soil conservation research, soil fertility analysis/recommendations and soils conservation training to technical personnel.

Construction of check dams is an integral part of the soil conservation programme in the Damodar Valley. The check dams constructed for soil and water conservation are very important tools of crop production by water harvesting and recycling. The D.V.C. is training and aiding the farmers in proper water management to utilize this created storage for crop production and pisciculture.

Impact of Check Dam in Study Area

The simple check dams for runoff harvesting besides serving the purpose of soil/water conservation have considerable impact on the agriculture of the region by providing supplemental irrigation to kharif crop and main irrigation to the Rabi crop. Three of big earthen structure with multiple drop spillway to control surplus runoff constructed on the main Karkara Nallah of the watershed (Fig. 2). The impact can be categorised as follows:

a) **Crop Production:** Stored water is recycled both by gravity flow and lift irrigation for now assured main monsoon crop and new previously non-existent second winter crop. This lead to phenomenal increase in cropping intensity. Due to runoff harvesting the single crop economy of the area is slowly changing and double and triple cropping is becoming possible. The transformation of the region from mono cropped area is certainly a big achievement which was maid possible by surface water harvesting.
b) **Employment Generation:** There is phenomenal addition to the employment man days per year.
c) **Change over to Commercial Agriculture from Subsistence Agriculture:** The phenomenon is reflected in the change over from subsistence cereal production to cash crop production such as potato (Table-1). Another indicator is the advanced sowing of potato from November to August. In the process the yield is reduced by 30% but price realised from the market is 100% above due to the early arrival in the market well before seasonal glut. The production of inferior minor millets was also discontinued.
d) **Improved Maintenance of Land:** As a result of the better yields from the lands farmers is putting in more efforts in the care of land such as maintenance of field barriers run off outfalls etc. This phenomenon results in more protection to the land from the forces of erosion. Without such initiative from the farmers, it is not possible to completely protect the land by government efforts alone.
e) **Increased reclamation activities:** Due to more favourable returns from the land the farmers themselves are coming forward to reclaim the land without any cost to Government. Hence, activities such as lavelling of land, construction of new fields barriers, irrigation channels, safe run off outfalls and cutting of humps to convert into profitable rice paddles has taken place. The shallow gullies are being levelled and converted into profitable rice paddles has taken place. The shallow gullies are being levelled and converted into profitable rice paddles.
f) **Increase in Cropping Area:** The area which is previously kept fallow for want of water is now used for crop production. In short each check dam has acted as a nucleus for the all round development of the surrounding area (Table-1).
g) **Pisciculture:** In the check dam reservoir the pisciculture has been developed by local villager. Due to fisheries the economic condition of villages have gone up. The authors interviewed several persons of the villages and found that about 7 to 8 percent families are directly earning their livelihood from pisciculture.

Table-1

Details of Pisciculture in Karkara Watershed

i)	Type of Culture		Composite
ii)	Year of Fingerlings Released		2022-2023
iii)	Total No. of Fingerlings Released		
		Banha	80,000
		Karakara	50,000
		Larhi	20,000
iv)	Size of Fingerlings		5.7 cm.
v)	Cost of Releasing Fingerlings		28,600,00
vi)	Artificial Feed and Manufacturing Done		Farmers
vii)	Type of Fingerlings		Rehu, Katla, Mirgal, Silvercup

CONCLUSION

On the basis of above facts we conclude that the farmers of the Karkara watershed have been motivated and organised to utilise the storage runoff water of check dams which they are managing themselves successfully leading to phenomenal impact on crop production. Irrigation through the harvested runoff water in small reservers behind each check dam has brought a total change in the cropping plan of the area. So runoff harvesting by check dam is the key to the development in the study area. Each check Dam acts as a nucleus of all round development assured stand by irrigation through runoff harvesting has changed a mono crop area into double or three crop area, changed subsistence farming to market oriented cash crop production, generated new employment opportunities, catalysed land reclamation and development gave impetus to pisciculture, fodder production. The production of inferior local millet has been discontinued and cash crops such as sugarcane and vegetables have introduced. So check dams for runoff harvesting under integrated watershed management programmes is the key to the development of study area.

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Conflict of Interest
The author(s) declared no conflict of interest.

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