

ENVIRONMENTAL IMPACT OF CHAKRIYA VIKAS PRANALI ON SOIL AND GROUNDWATER: A CASE STUDY OF JORKAT VILLAGE OF PALAMU DISTRICT, JHARKHAND, INDIA

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ABSTRACT

The Chakriya Vikas Pranali changes degraded land to upgraded land which increases groundwater level, soil composition resulting change in structure, texture and water holding capacity of the soil. Plantation in the Treated zone increases rainwater in the area and porosity and permeability of the soil increases thus increasing percolation of rainwater.

KEY WORDS: Chakriya Vikas Pranali, groundwater, soil composition, treated zone, percolation, rainwater.

INTRODUCTION

Land and water management is the primary program for regeneration of degraded land, which checks the soil erosion and facilitates in-situ conservation of rainwater. It helps to change the environment, enhance water storage capacity in hard rock terrain, and change soil composition, ultimately increasing soil fertility. Organic matter serves as a reservoir of nutrients and water in the soil also aids in reducing compaction and surface crusting and thus increases water infiltration into the soil. Organic matter in the soil helps nutrient supply to the plants, increases water holding capacity of the soil, and prevents soil erosion.

STUDY AREA

The state of Jharkhand covers a total area of about 79714 sq km has 24 districts and a population of about 26.9 million. The state has 152 towns and 32615 villages. The average rainfall is about 1400mm.

The village Jorkat is located in Medininagar C.D. block of Palamu district in the state of Jharkhand in India. It is governed by Korla Gram Panchayat. The nearest town and railway station is Medininagar, which is about 10 kilometer away from Jorkat. The village is connected by public bus services. As per available data from the year 2009, 782 persons live in 149 house holds in the village Jorkat. The total area of Jorkat is 411 hectares. The population density of Jorkat is 190.27 persons per sq km. the pin code is 822102. The study area is covered in the Toposheet No. F45A1 of Survey of India.

GEOLOGY OF THE AREA

The district of Palamu is covered by three major geological formations viz., the Precambrian crystalline, Vindhyan and the Gondwanas. Besides the Tertiary laterite and alluvium also cover part of the district. The study area is covered by Granitoid gneiss as Precambrian basement and shales and sandstones as a part of the representation of Gondwanas. The alluvium cover of considerable thickness occurs in the northern part of the district along the Sone and North Koel rivers. The groundwater occurs mostly under phreatic condition in all lithological units and locally under semi confined and confined conditions. The general slope of the area is from south to north to the Sone river.



Geological Map of Palamu



CHAKRIYA VIKAS PRANALI

Chakriya Vikas Pranali is a natural cycle of development where the profile of one cycle becomes capital for the next linked cycle and thus refinancing is not needed to run the program. After the gestation period the system will have its own resource to run the project.

The concept of cyclic system of development was originally conceived Padmashree Dr. P.R. Mishra and implemented at Sukhomajri near Chandigarh in the hills of Shivalik range, and further replicated successfully in Palamu. The concept revolves around the age old principle of optimal utilization basic ingredients of nature i.e. land, water, air, and the sun with the involvement of the communities, which not only create economic wealth but also bring these components of the nature back into their pristine condition; even they are in degraded condition.

This concept not only creates the economic wealth but also an environmental and social wealth for ensuring long term sustainable development. This is achieved through the involvement of the local community and by creating institutional mechanism within which it works in a totally transparent manner. The features like thrift, transparency, equity are the inherent characteristics of this concept. The Chakriya Vikas Pranali creates a common pool of degraded land. The soil and water conservation are applied and the whole community is involved irrespective of their economic or the social status with the produce being shared in an equitable manner so important for sustainability of the development.

The profits are shared as 30% share to the students (workers are called student), 30% to the land owners, 30% share as the saving of the cycle for use as capital for next cycle and 10% share to Gram Kosh (village fund) for social and economic development of the village.

The core features of Chakriya Vikas Pranali are-

- a) Conversion of private land into common pool resources.
- b) Maximum utilization of rainfall through water conservation in situ and small tanks and ponds and its concentrated use through introduction of a new, intensive multilayered land use system with very high potential yield.
- c) Mobilization of villager's organization for management of regeneration of resources and
- d) Distribution of benefits to land owners, workers and village society for development of social infrastructure, school, health centre etc.

The pooled includes the marginal fragmented land and land owners, who willingly give their degraded land as the system ensures that the land remains their property. The students are generally landless idle human resources as also the committed supporters of the concept. The multitier and multi rooted planting system is adopted. The selection of plant system is based on the soil quality, water availability and local demand and is decided by the community.

ENVIRONMENTAL IMPACT OF CHAKRIYA VIKAS PRANALI

The environmental impact of Chakriya Vikas Pranali vary from place to place. The most important effect of Chakriya Vikas Pranali is the change in soil composition due to mixing up of leaf litters and other plant and organism fragments with the top soil cover to form organic matter. The compositional change in soil composition enriched the nutrients of the soil and also changed texture, structure as well as water holding capacity of the soil. the soil with organic matter is less compacted which increases the porosity and permeability of the soil.

The artificial recharge of ground water also increases the ground water level in the area. There are various methods of artificial recharge of ground water are being done in the area like tie ridges, nala-bounding, check dams and also ponds are created to store rain water which increases the water table in the area.

In Palamu the monsoonal rains are between June and September. It is therefore necessary to harvest the monsoon runoff in small percolation ponds in mini catchments by constructing check dams and allowing stored water to percolate and recharge ground water body. This increases the water level from 50ft to 25ft in few years backs to present days in the area.

In the treated zone, the leaf litters fall and mix up as biomass with the top cover of soil during the rainy season and change the soil composition, thus increasing soil fertility. The organic matter serves as a reservoir of nutrients and water in the soil and aids in reducing compaction and surface crusting and increasing water infiltration into the soil. Also, organic matter helps to increase water holding capacity and prevents erosion of the soil. Thus organic matter in the soil helps plant growth and increases the water level in the area.

Organic matter causes soil to clump and form soil aggregates, which improves soil structure. With better soil structure, permeability (infiltration through the soil) increases. It enhances the soil's ability to take up and hold water.

The villager Suresh Prajapati of Jorkat village is doing many innovative works to increase the soil composition by making bio-fertilizers by dumping vegetative materials in tanks and allow to decompose it for few months. He is trying to increase water level by making tie ridges in his fields and also allowing discharged water of hand pumps into the surface to recharge ground water in the area. During the field work I suggested villagers various methods to recharge groundwater and to increase the soil composition. In the area many check dams have constructed which increasing the water level. Some villagers made recharge of underground water by diverting the surface run off to small pits in the field and also directing extra water of hand pumps into the surface which increases the water level of the area.

**Dam increasing water level in the area****Water level nearer to the surface in the well****Groundwater recharge through Hand pump****Increase in organic matter through plantation in the area**

CONCLUSION

The change in soil composition due to mixing up of organic materials with the top soil cover which increased the

porosity, permeability thus infiltration of rain water to the underground water increasing regularly resulting into increase in water level of the area. Due to mixing up of organic matter the soil became less compacted and enriched soil composition increased fertility and thus crop production of the area increased which raised income of farmers of the area. In the area increased plantation retards erosion of soil and speed of running off water and increases percolation. Artificial recharge by constructing check dams and other methods also increasing the water level of the area.

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