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Study on the Significance and the Drivers of Indigenous Traditional Knowledge in Agricultural Water Resource Management in Water Scarcity Purulia District of West Bengal

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Abstract

The paper focuses on the Indigenous traditional knowledge as a vital resource of society with multidimensional use. We can see the application of this knowledge in the field of agriculture, water resource management, disease treatment etc. Agricultural water resource management is a big challenge in the drought prone and topographically diversified Purulia district. This district is the homeland of different indigenous people. Tribal community dominated Purulia district have its own cultural heritage, still today the indigenous people are using their ancestor's knowledge in different arena of life. This article tries to find out the different traditional and local methods, techniques and tools of agricultural water resource management and their significance in the field of efficient water resource management, it also focuses on the factors which attempt to drive away this local knowledge from grass root level.

Keywords: Indigenous knowledge, water management, Agricultural water resource management, Indigenous resource management.

Introduction

According to United Nations Convention on Biological Diversity – UNCBD "Indigenous knowledge or Traditional Knowledge refers to the knowledge, innovations and practices of indigenous and local communities around the world." This knowledge is developed from experience gained over the centuries. It is adapted to the local culture and local environment, and preserved through oral transmission across generations. It is being existed in the society in its collective form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local languages, and agricultural practices. The traditional knowledge that existed among farmers helped them to the development of plant species and animal breeds. The information, skills, practices and products is a form of natural assets which is often associated with indigenous peoples. It is noted that such knowledge and skills are deeply rooted in a specific political, cultural, religious and environmental context, and it is a key part of the community's interaction with the natural environment (IISD, 2003).

This knowledge is acquired and utilized by indigenous communities and individuals through long-term socio-cultural, spiritual and environmental engagement so it is an important element of the intellectual

and cultural heritage of indigenous peoples; it reflects their social and historical identity and significantly contributes to the future well-being and sustainable development of these peoples.

Although the world is passing through the age of science and technology, the TK is recognised and gaining importance in policy arena as well. The policy makers, development practitioners and the public at large have become increasingly aware of the importance of traditional knowledge in the promotion of sustainable development (Davies and Ebbe, 1993). Presently, The World Bank was the first multilateral development agency who establish a special policy for indigenous peoples in internationally funded development projects, a policy that dates back to the early 1980s (Davis and Ebbe, 1993). The significance of such a pool of knowledge for sustainable development was officially recognised as far back as 1987 in the Brundtland Commission Report, "Our Common Future" (1987). The role of indigenous knowledge was similarly acknowledged at the Earth Summit in Rio de Janeiro in 1992, and is incorporated in the "Agenda 21" documents of the United Nations and the International Convention on Biodiversity.

Both reports emphasised that the sustainable management of natural resources could only be achieved by developing a science based on the priorities of local people and creating a technological base that blends both traditional and modern approaches to solving problems (Johnson, 1992). Because of huge significance we can see the application of Traditional knowledge in the field of agriculture, irrigation, fisheries, forestry, even modern industries such as pharmaceuticals, botanical medicines, cosmetics and toiletries, biological pesticides manufacturing industries also using time tested traditional knowledge for developing the eco-friendly industrial products which have good commercial acceptability. (Chambers *et al,* 1989, Richards 1985, Scoones and Thompson,1994).

Capital intensive approaches of production have tended to marginalise the resource poor, so more and more concentration is given on sustainable agriculture, fishing and forestry (Chadwick, 1996, Brokensha *et al* 1980, Hausler *et al* 1995; Warren *et* al, 1995).

As far as water resources are concerned, the humanity is facing acute water shortages both from surface water and ground water sources. (Sarup, Tiwari and Khatediya, 2011). The ascending rate of world's population and limitation of natural resources compel people to seek efficient and wise use of water resources. That is why this traditional technology is gaining new popularity these days. The problem of low rainfall and uneven distribution of it throughout the season create water shortage in arid, semi-arid and sub humid regions, it also makes rain fed agriculture a risky enterprise. Therefore new interest came up in recent decades to evaluate traditional water management techniques (Prinz et.al. 1999).

In India, according to the report of the Ministry of Agriculture & Farmers Welfare (2015-16) the agriculture and allied sector continues to be pivotal to the sustainable growth and development of the Indian economy. Not only does it meet the food and nutritional requirements of 1.3 billion Indians, but also contributes significantly to production, employment and demand generation through various backward and forward linkages. As Indian agriculture depends both on surface and ground water resource so it is essential for farmers to use both the resources with a view to sustain it. As per the Central Water Commission, 85.3% of the total water consumed for agriculture in the year 2000.The population of India is likely to be 1.6 billion by 2050, resulting in increased demand for water, food and energy. So pressure on food, surface and ground water resource progressively ascending in India, as a result of which our country is gradually propagated towards the resource emergency (Dhawan V,2017). So in this context the significance of farmer's Traditional Knowledge in agricultural water resource

management gaining importance. For serving this purpose the study tries to focus on the following objectives

Objectives-

1. Finding out the traditional water resource management technology and technique.
2. Examine the socio economic factors that drive the Traditional Knowledge at local level.

Why Purulia?

According to West Bengal State Agriculture Department report West Bengal is predominantly an agrarian state. Comprising of only 2.7% of India's geographical area, it supports nearly 8% of its population. The cropping intensity of this state is 184.

Purulia, the western most district of West Bengal is characterised by undulating topography with shallow soil. The region has also very limited ground water. The terrain, however, receives good amount of rainfall but recurrent droughts are very common in the Purulia district; that is why the entire district has come under DPAP programme. Agriculture is the principal source of livelihood in Purulia. Almost 70 percent of the working population gets engaged in agriculture either as cultivators or as agricultural labourers.

The soil in this region is mostly nutrient-poor, red sandy, or red and yellow. The combination of an undulating and hilly terrain and high rainfall produces wide variation in soils, slope, water availability, soil depths, etc. even within the boundaries of the smallest village. Though there are variations across the upper, middle and lower reaches, the overall pattern repeats itself village after village—dry uplands with shallow soils, dry midlands with deeper soils, and wet lowlands with deep soils. In fact, the local terms for land classification incorporate these variations—*Tand* (upland), *Baid* (medium upland), *Kanali* (medium lowland) and *Bohal* (lowland) in Bengali. This makes Water Resource Management a complex process in this region. Here farmers use their traditional knowledge in every sphere of life to make their lives easy and smooth. In dry-land areas where availability of water is not sufficient throughout the year it is a challenge for the local people to solved the problem with their traditional knowledge and in most of the places they are successful. Consequently, for agricultural water resource management in water scanty zones like Purulia, planners are focusing on the traditional knowledge and ways of the local people.

Methodology

The work has been done mainly on qualitative approach where main emphasis is given on facts rather than the figures but in some cases some numerical data are been used.

After thorough review of old relevant literature some traditional and old technology and tools of agricultural water resource management was identified in the initial part of this work.

Purulia is under agro-climatic zone VII it has intra regional diversity of topography. So based on the slope of the land the entire district was divided into four category Upland with more than 6˚ slope, Middle upland with 4˚-6˚ slope, Middle Low land with 2˚-4˚ slope, Low land with below 2˚ slope. After that some study area has been selected from every category.

Walk over plots and informal interview with farmers regarding their agricultural water resource management was done to collect qualitative data.

Focus group discussion with old farmers helps to understand the drivers.

Observation

1. Contour Bunds

Bunds are basically a small embankments, embankment type structures constructed across the slope of the land either with soil or stone. The height of this bunds is different in different height and slope depending on the nature of the surface run off.

The major advantage of this type of water harvesting system is that it can arrest the surface run off on its back side and a temporary wet land is developed on the back side of the bund and with this water farmers can cultivate paddy and other water hungry crops. Another advantage of this system is that when the water supply increase then surplus water comes to the next level where height and slope of the land is less than the previous one by the cutting of upstream side mounds of the plot.

So this kind of contour bund system is successfully able to store rain water in the sloppy land. This technique is been practiced from historical past.

Field bounding is generally done in middle uplands, having less than 3% slope, to be used for intensive agriculture.

2. On Field pit

In Purulia as the availability of water is less so every farmer left some percentage of land in the agricultural field for water holding purpose which is generally 5% of the total land, so now a days this is popularly known as 5% model. The rain water hold in the pits to irrigates the plots during water scarcity. This method is suitable for medium uplands. The area of this pit is basically 5% of the total field area. The pit is generally 6 to 7 ft deep, with field bunds with excavated earth.

Sometime in the upland areas farmers divided the upland into small plots of 30×40ft (30 ft along the slope and 40 ft across the slope) and dig pits at the lowest point of the each plot. Bounding of the plot is done by the soil dug out of the pits. This pit is basically 7 ft long and 7 ft width with 3 ft depth.

3. Wells

Dug wells are one of the old irrigation structures constructed on the upland, where agro-horticulture or vegetable cultivation is planned. It can also be constructed in the low/valley lands to tap the sub-surface water. These wells are use for domestic purposes too.

4. Staggered trench

Pits are excavated across the slope of the unbounded land to collect runoff during spells of rain. This trench allows gradual percolation into the soil mass. It is very low-cost method of soil and water conservation which is practiced in the sloppy land of Purulia since the immemorial past as a substitute the contour bounding/trenching in greater than 8 degree slopes. This trench are basically 6 ft in length,2 ft wide and 1 ft depth with a total 12 cft holding capacity.

The trenches located directly below one another in alternate rows.

Excavated soil are been placed in the form of a bund in front of the trenches. Plantations took place in the space between the trenches and the bunds, grasses may be planted in the bunds.

The trench and the bund together act as a barrier to the runoff, and check soil erosion.

Local people do this work every year after the harvesting of Aman paddy because labor availability is more during this time, the soil of the land is more soft during this time to dug the trenches, another main reason is that it can recharge the soil moisture and water table soon so that the production may not affected.

In Purulia percentage of barren land along the slopes which is not bundled or terraced is quite large. Due to the slope, both soil and nutrients erode very fast which makes agriculture on these lands an

uneconomical activity. People with land of this type adopted this staggered trench to grow plants that can meet their fuel, fodder, fiber and timber needs. However, the technique is viable only when the land has at least 1-foot deep soil that can be excavated manually. This type of trench is big enough to store the expected runoff volume. The bunds behind the trenches provide for additional storage in case the runoff exceeds the average.

Drivers of Traditional knowledge -

From the focus group discussion with the farmers it has been observed that the drivers of this ancestor's knowledge are –

1. Lack of community participation-

Once in this area land was the property of society or social group and people actively work for agricultural water resource management, as for example people voluntary dig pit and wells for water conservation but as time goes self centric mentality makes then inactive. As agricultural water resource management is a huge task so lack of cumulative efforts makes it impossible, as a result this senior's wisdom they gradually forgot. But with the introduction of DPAP and MGNREGA scheme the local resource are gradually created with the modernization of Senior's wisdom, in this work NGOs play a very vital role. The intellectual of those NGOs constantly work on low cost resource creation mechanism and in this aspect renovation of ancestor's technology and tools are the best alternative, because those are ecologically and economically friendly.

2. Cast conflict

In Purulia the agricultural land is mainly four type *Tand* (upland), *Baid* (medium upland), *Kanali* (medium lowland) and *Bohal* (lowland).This low land and medium lowland are very fertile and this land is mainly occupied by upper class people where as upland and middle upland is occupied by Dalit community. As this upper class people have money so they ignore traditional tools and technique and they replace their ancestor's knowledge by modern tools and technique. On the other hand upland poor farmers still try to survive with their traditional knowledge, but a inter generational conflict arise regarding the use of tools and technique among the upland tribes. Grandfather try to apply their traditional tools and technique but grandson ignore his opinion by referencing lowland upper cast farmers.

On the other hand in the uplands when tribal people arrest surface runoff by their traditional knowledge an issue of cast conflict arise regarding water sharing.

3. Lack of contribution mentality

After land reform when farmers get individual Patta of agricultural land then they become selfish, they don't wants to contribute a single inch of land for community development purpose. As for example on a water catchment area if one Tank is needed for water conservation then it will definitely been constructed in the lower most portion of the catchment but sometime the landowner only think about his personal profit and loss as a result the entire work was postponed, in this way seniors wisdom gradually washed out.

Conclusion

Traditional knowledge still can play as a vital resource for the development of the society. It is more economical as well as eco-friendly. As this knowledge is developed from the long term interaction between nature and its indigenous people so it has its deep root. In Purulia instate of water scarcity

farmers sustained with their traditional agricultural water resource management technology, but because of modern technological advancement, and lack of active community participation now a day a numbers of traditional skill was erased from society, but parallelly few traditional tools and technique comes in modern way with the interaction with modern technology. In fact the significance of the traditional knowledge is gradually gaining importance for sustainable and economically viable water resource management in the agricultural field.

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