

# EXPLORING THE SOCIO-ECONOMIC EFFECTS OF COMMUNITY TANKS: A CASE STUDY FROM MAYURBHANJ DISTRICT

**Debananda Bindhani<sup>a</sup>, Lakesh Bindhani<sup>b</sup>**

<sup>a</sup>Research Assistant, Sri Sri University, Cuttack, Odisha

<sup>b</sup>Lecturer in Computer Science, Purnachandra Higher Secondary School, Baripada, Mayurbhanj, Odisha

Article DOI: <https://doi.org/10.36713/epra24123>

DOI No: 10.36713/epra24123

## ABSTRACT

The socioeconomic status of the people is one of the most important ways to figure out their social and economic standing. It also changes the social aspects of families, such as their health, schooling, sanitation, and so on. However, there are times when unknown problems, like climate change, make it challenging for the economy to grow and for society and the country as a whole to progress. That's why people in rural areas come up with different ways to address and improve their social problems. Most of the homes in the semi-arid hilly area depend on pond water to endure changes in the weather. Changes in the weather are making it challenging for the farm sector and other linked ways of making a living. This study looks at how traditional methods of collecting water can help improve the social and economic situations of rural families in the Mayurbhanj district. This study also looks at how community tanks can help improve agricultural production. For example, this is especially true because there aren't enough irrigation systems, and most farms count on rain to grow their crops. Having a good plan for dealing with climate change is very important for making sure that farming areas can continue to make a living.

**KEY WORDS:** Climate Change; Community Tanks; Sustainable Livelihood; Traditional Irrigation System; Coping Strategy

## 1. INTRODUCTION

The Indian economy is expanding at a more consistent rate, but there are several distortions that make it look worse. The country's infrastructure is woefully inadequate, poverty rates are high, the agricultural sector is falling behind, natural resources are deteriorating, and regional and socioeconomic disparities are widening. Concerns about poverty alleviation, environmental management, and human resource development revolve around the need for sufficient and sustainable livelihoods, which is becoming more and more acknowledged on a global scale. So, after India signed the Millennium Declaration in 2000, it acknowledged and attempted to improve the lives of the poor as a valid governmental objective. Within India's development paradigm, rural development ranks high among the most pressing concerns. Seventy percent of India's population resides in rural regions. Given their harsh living conditions, escaping the underdevelopment trap is a challenging task. To alleviate these types of problems and offer more greenery and fragrance to rural India, it is essential to establish certain legislative recommendations to improve their lives. Rural development should form the basis of policy, according to Gandhian thinking, as issues at the grassroots level impede national growth. In this regard community tanks play a pivotal role to improve socio-economic scenario of the rural people of the Mayurbhanj district of Odisha. Community tanks are small to medium-sized reservoirs that have been around for a long time and are used to collect and store rainwater. They often have more than one purpose, such as providing irrigation, drinking water, and a home for local wildlife. In the past, these tanks were an important part of water distribution systems that were administered and cared for by the people in the area. This decentralized strategy for managing water is different from big irrigation projects that depend on central control (Goverde, 2006). The Tamilnadu region in India, for instance, has more than 39000 of these tanks, which are still very important for keeping rural people alive (Moench and Dixit, 2004).

There are a lot of community ponds in the rural region of the Mayurbhanj district of Odisha, ranging from small to medium in size. Unfortunately, improper management has left most of them underutilized. One alternative strategy to address the water shortage is to support local initiatives that aim to exploit such underused sources of water. The traditional water collection method and its positive impact on rural families' socioeconomic situations in the Mayurbhanj area are the subject of this research. This study assesses the use of community tanks as a tool to boost agricultural output. This issue is especially due to the fact that most farmers rely on rain for crop production and there is insufficient irrigation infrastructure. For agricultural communities to be able to continue making a living, there must be a plan to combat climate change. The community tank will generate additional income for the community by providing multiple benefits from its various uses. The majority agreed that the additional income could support new adaptation measures. Under rain-fed situations with limited sources of irrigation, community tanks would play a crucial role in dealing with the impact of climate alteration.

## 2. REVIEW OF LITERATURE

Community tanks, which are small, man-made bodies of water that are mainly used to store rainwater, have been an important part of rural water management systems in many parts of the world for a long time. These systems, which are common in South Asia, Southeast Asia, and even parts of Africa, have been important for farming, raising animals, and even community-based livelihoods for hundreds of years. But as cities and industries have grown quickly, the relevance of community tanks has changed, especially when it comes to their effects on society and the economy. This literature review looks at the social and economic effects of community tanks, focusing on how they help with agricultural productivity, social cohesion, economic empowerment, and environmental sustainability.

### 2.1 The Productivity of Farming

One of the most direct benefits of community tanks on society and the economy is how they affect farming productivity. Community tanks are typically very important for irrigation, especially in areas that are dry or semi-arid and don't get rain on a regular basis. Shah's (2006) research shows that traditional water storage techniques, such as communal tanks, are directly linked to higher agricultural output. Rehabilitating community tanks in Tamil Nadu has been found to increase rice production by up to 25%, allowing farmers to grow crops during the dry season and earn a more stable income (Shah et al., 2006). Also, the water in these tanks may support a variety of crops, not only basic grains like rice. This includes fruits, vegetables, and feed for livestock, which can help farmers make more money. This diversification is very important for improving food security and making people less vulnerable to climate-related shocks, as shown in rural areas of India and Sri Lanka (Shivakumar et al., 2011). However, local groups must work together to keep these tanks in good shape. Community-based irrigation systems, like those that tanks support, work best when there are strong social networks that make sure water is shared fairly, repairs are made on time, and ongoing governance is in place (Barlett, 2005). This kind of community management has made agricultural operations more flexible and resilient. Local farmers are involved in making decisions about how to allocate and maintain water.

### 2.2 Governance and Social Cohesion

Community tanks also have a big effect on how people get along with each other. Rural communities work together better when they own and manage water resources together. The governance mechanisms around these tanks are frequently open to everyone. Local leaders or community organizations often lead talks about how to distribute, maintain, and repair the water. Community tanks helped bring different social groups together, including women and lower castes, who might not normally have access to formal political power (Duncan, 2008). There are also problems with governance, though. In some cases, unfairness in the allocation of water has occurred, sometimes because of power imbalances in the community, including when higher castes or economically favored groups are in charge. Community management methods are generally praised for being open to everyone, yet in some places, the unequal distribution of power might make social divisions worse (Dreze and 2002). To rectify these inequities, experts advocate for the creation of transparent governance frameworks that guarantee the involvement of all stakeholders, especially underprivileged communities (Shah and Korten, 2002).

### 2.3 Economic Empowerment and Diversifying Sources of Income

Community tanks can help rural people economically by giving them a variety of ways to make money. Community tanks can help the local economy thrive by promoting small-scale fisheries, livestock husbandry, and even eco-

tourism. Research in Southeast Asia indicates that tanks facilitate small-scale fisheries, which yield a vital protein source for local communities and generate supplementary money (Joubert, 2006). Community tanks have been found to directly help rural livelihoods in places where there aren't many official jobs. A major example is in India's Karnataka region, where fixing up tanks has led to the growth of small enterprises connected to fish farming, moving water, and maintaining tanks (Mani and Nambirajan, 2014). These enterprises give young people in the area jobs and help the economy move away from farming. Water-based jobs like fishing and farming can help rural areas weather economic downturns (Ninan, 2007). This variety helps rural economies stay strong when things go wrong, as when commodity prices go up and down or when the weather is not good.

#### **2.4 Sustainability of the Environment**

Community tanks are good for the economy, but they also help the environment a lot. They are vital for saving water, improving groundwater recharge, and lowering the chances of floods and droughts by controlling surface runoff (Moench & Dixit, 2004). These tanks also make a good home for a lot of different kinds of fish, birds, and other aquatic critters (Goverde, 2006).

Because of climate change, community tanks are becoming even more necessary for storing water. Tanks are a low-cost, decentralized way for communities to protect themselves from water shortages as rainfall patterns change and droughts become more common. Surface water bodies like tanks, could help people adapt to climate change by making them less dependent on big, centralized infrastructure (Kallis, 2008). But if they are not managed well, they could harm the ecosystem. These tanks can hold less and less clean water over time because of encroachment, sedimentation, and contamination from farm runoff. Community-based management measures, like regular desilting and stopping encroachment, are necessary to keep these water bodies healthy for the environment (Shiva, 2022).

Climate change has also made it harder for conventional water systems, such communal tanks, to work properly. The Intergovernmental Panel on Climate Change (IPCC) released a report in 2014 that said that erratic rainfall patterns could make water less available in many areas. This could make community tanks less useful, especially in semi-arid areas.

### **3. RESEARCH METHODOLOGY**

This study is based on primary data. Primary data are collected through household questionnaires. In order to analyse before-and-after intervention situations, primary information was collected from 50 households of the Mayurbhanj under three different community tanks. The households are selected randomly from those who are using the community tanks for various purposes. The regression analysis tool is used to show the relationship among the different variables and the socio-economic impact of community tanks. The regression results are estimated with the help of MS Excel and STATA. Charts and graphs also have been used to show the percentage change of the households and benefits received from the community tanks.

#### **3.1 Description of the Study Area**

The study sites were Pathuri, Basketala, and Gola Mundhakata village of Mayurbhanj district of Odisha. Mayurbhanj represents a panorama of many millennia in the human story. The Similipal Hills, still untrodden in many parts, have a charm of their own and are rich in natural resources. The Mayurbhanj district of Odisha is a tribal-dominated area (57.67%). The general climate of the district is characterized by oppressive heat in summer and severe cold winters with high humidity throughout the year. The rainfall distribution is equal during the monsoon period. The period from June to September is the rainy season, and the district experiences it from the southwest monsoon. May is the hottest month, when the mean daily maximum temperature increases up to 47° Celsius. This district is surrounded by a number of forest areas as well as the Rocky Mountains. People used to cultivate paddy in most parts of the hill slopes and in plain lands. Most of the cultivators grow short-duration local paddy in the unbounded upland during the Kharif season. The crop suffers moisture stress at different stages due to inadequate rainfall and climate uncertainties like flood, cyclone, drought, heat wave, and lightning, causing devastation in the fertile region as well as loss of lives and properties in some parts of this district every year. So it is natural that the people are in a low socio-economic condition.

## 4. SOCIO-ECONOMIC IMPACT OF COMMUNITY TANK

### 4.1 Economic Impact of Community Tank

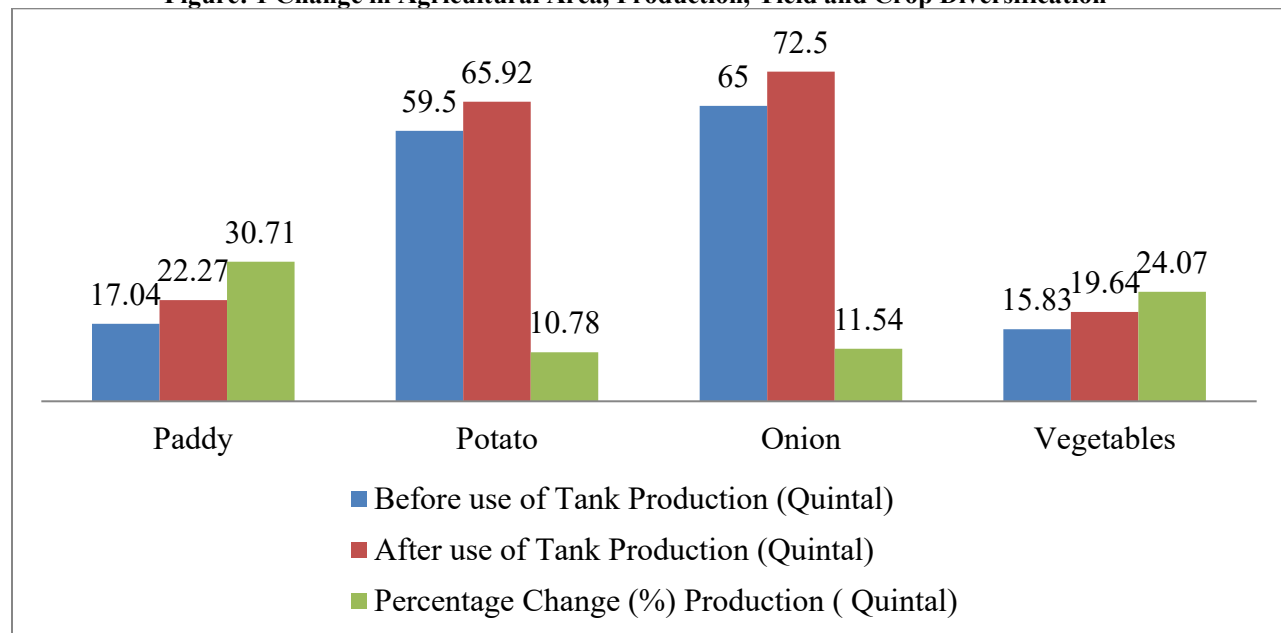
The agriculture sector of the area has benefitted immensely by the bridge. With easy access to input and output markets, farmers have started growing a variety of crops like groundnuts, pulses, vegetables, fruits, etc., along with paddy on a commercial basis, leading to an increase in cropping intensity and greater crop diversification in the area. Some of the farmers we interacted with reported that they have expanded the area of their orchards, which has provided them with greater access to markets.

#### 4.1.1 Impact on Farm Size and Productivity

The farm size, access to inputs, and occupational diversity have statistically significant and positive effects, while workforce mobility has a negative impact on the change in land use. Community tanks helped the farmers to source agricultural inputs from outside and allowed them to change land use patterns. This has happened largely to households that also have large farm sizes. However, the factors such as age, gender, and education of the head of the household; size of the workforce; marketing of farm output; and fresh loan grants do not have a significant impact on the change in land use. The major crops grown in the study area of Mayurbhanj district include paddy, potato, onion, vegetables, etc. A few farmers are involved in the small-scale vegetable cultivation, but the potential exists for further scale-up because of good connectivity and irrigation from the community tanks.

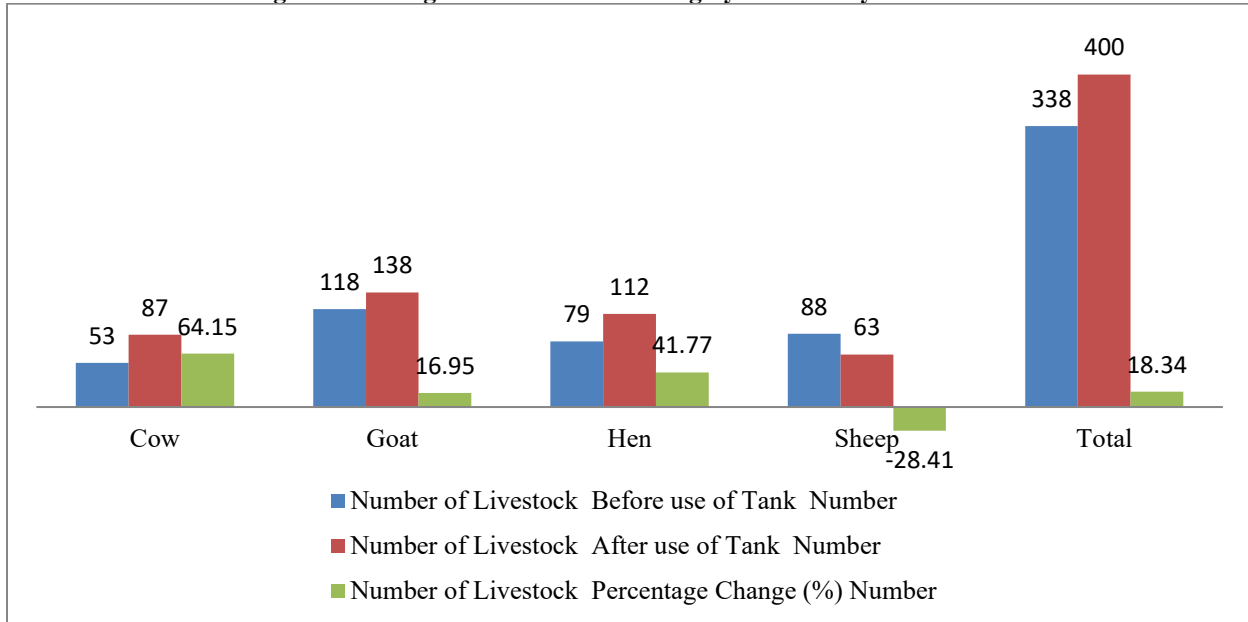
Figure 1 shows the before and after agricultural situations of the local households. Basically the local farmers were depending on rainwater for cultivation, but now they can cultivate in the dry season and during the climate uncertainty due to the presence of the tank. It is clear that the percentage change in paddy and vegetable is very remarkable, which is 30.71 percent and 24.07 percent, respectively, and this is due to influence by the community tanks irrigation.

**Figure: 1 Change in Agricultural Area, Production, Yield and Crop Diversification**



#### 4.1.2 Impact on Livestock of the Households

Figure: 3 Changes in Livestock Holding by Beneficiary Households

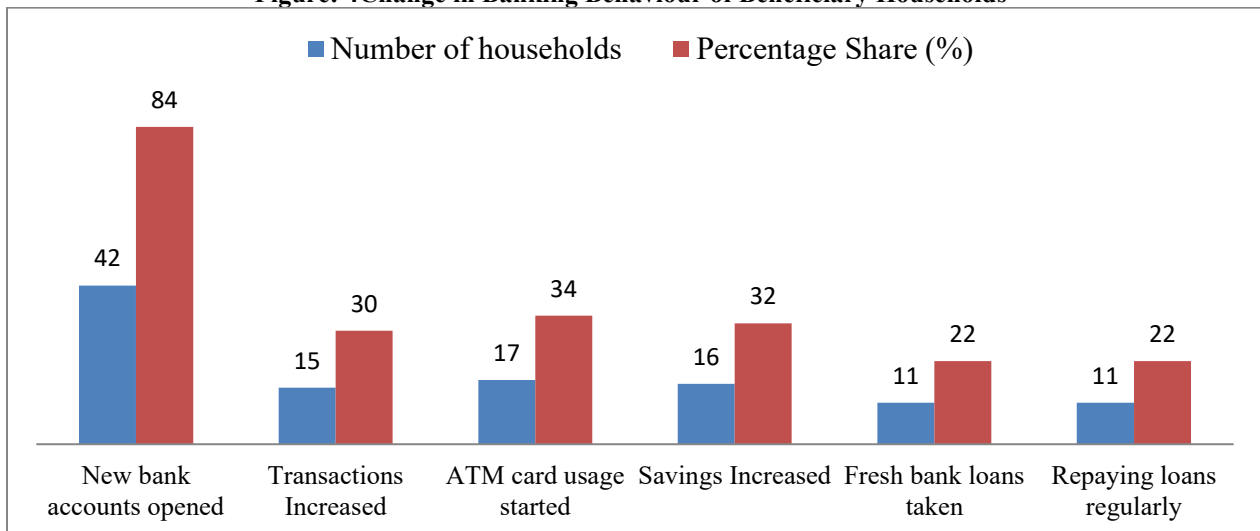


It is found that the size of the workforce and farm size have a statistically significant and positive effect on livestock holding. Households are more likely to increase their livestock to meet future uncertainties as well as increase their economic status. Besides, households having large farm sizes are also likely to increase their livestock size. Easier access to inputs has shifted focus furthermore to agriculture from rearing livestock, which is a remarkable impact of community tanks in the rural area. Figure 3 denotes that the total change in livestock among households is 18.34 percent.

#### 4.1.3 Impact on Banking Transaction

It is observed that there is a significant impact on the banking sector as community tanks generate greater livelihood opportunities and expand the income base of rural people. The irrigation projects can help reduce cultivation costs and boost productivity in the sector.

Figure: 4 Change in Banking Behaviour of Beneficiary Households



Increased agricultural productivity following expansion of irrigation is expected to enhance the income of households, which in turn may enable them to deposit surplus income in nearby banks. With a larger scope for farming, expansion of their deposit, and an increase in the credit absorption capacity of beneficiary households. Similarly, the growth of agriculture enhances the workforce, farm employment, etc. Hence, a deeper evaluation of the impact of the tanks accrued to banks in terms of their business and financial inclusion of rural households.

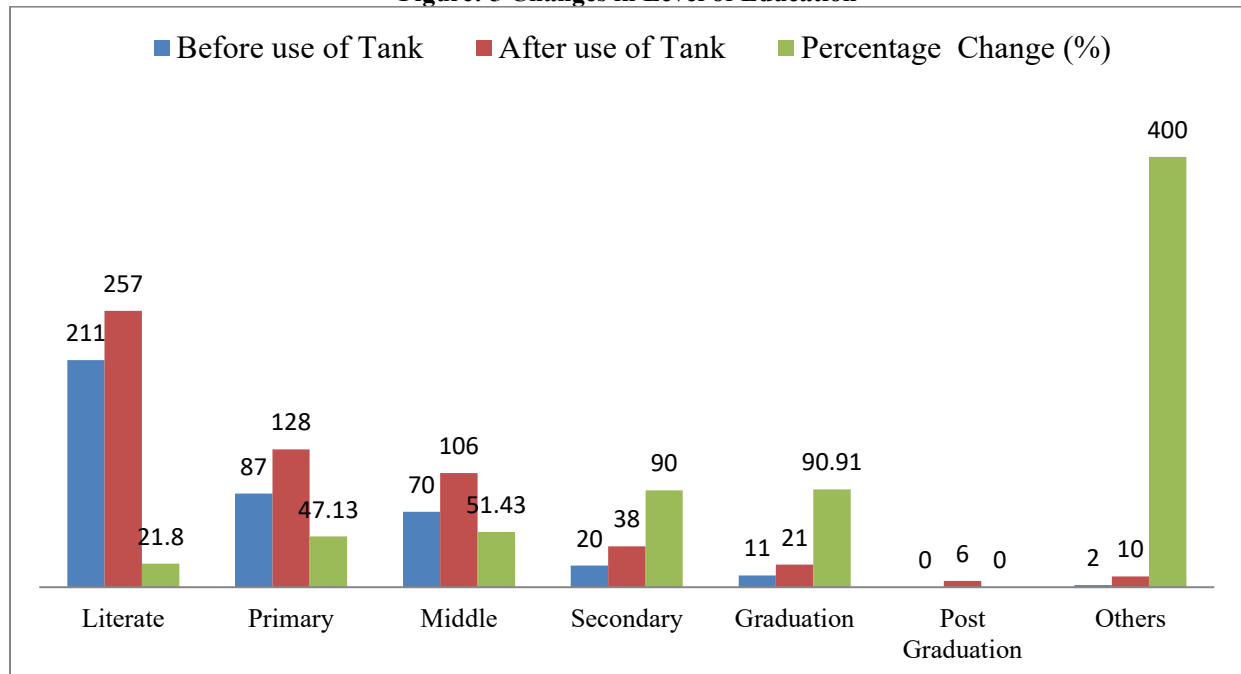
#### 4.2 Social Impact of Community Tanks

This is clear from the study that the impact of community tanks is very remarkable towards the betterment of the livelihood as well as to develop their surrounding with environmental sustainable for the people. With numerous new opportunities for consumption and changes in technology and living conditions, rural connectivity projects have caused socio-economic changes in the lives of rural households. By allowing for easier availability of technologies that lead to better and healthier living, building of human capital, connectivity projects can help immensely in this regard.

##### 4.2.1 Impact on Education of the households

Figure 5 reveals that the use of the community tank significantly increases the level of education from primary to postgraduate. Basically in the rural area people can't afford higher education for their children, but now it is seen that people are sending their children for higher education. In the regression result, which is shown in Table 3, it is observed that the relationship between income and educational expenditure is statistically significant at the 2 percent level. It is also found that the marginal effects of opening bank accounts, granting fresh loans, and the ability to market products on educational expenditure are statistically significant and positive, while the size of the workforce and access to farm inputs have no significant impact on the same. This phenomenon is because the households that have fewer working members and use fewer agricultural inputs spend more on education. On the other hand, the households who have bank accounts and have been able to obtain bank loans have higher educational expenditure.

Figure: 5 Changes in Level of Education

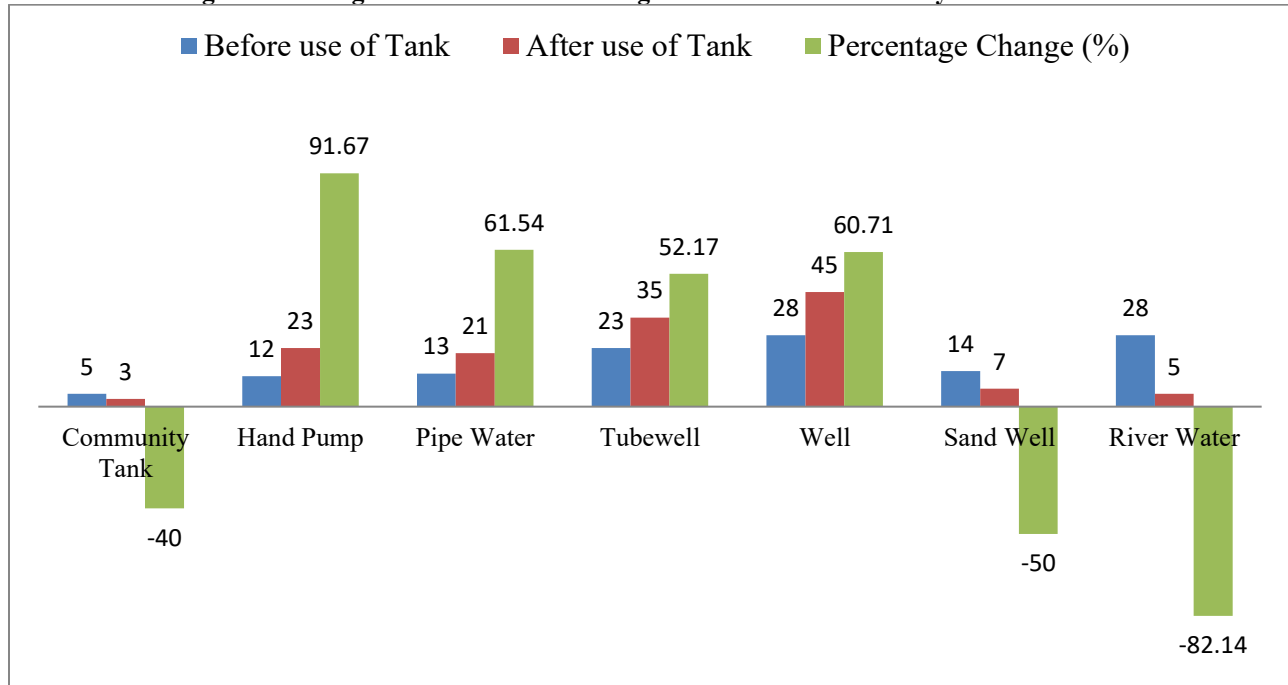


##### 4.2.2 Impact on Health and Sanitation of the Households

Incomes of the households' head have a statistically significant and positive effect. Households having a male head and fresh bank loans spend more on healthcare. Also, with greater use of farm inputs, one needs to take care of health, as certain chemicals used may cause adverse impact on life. However, age and education of the household head, farm

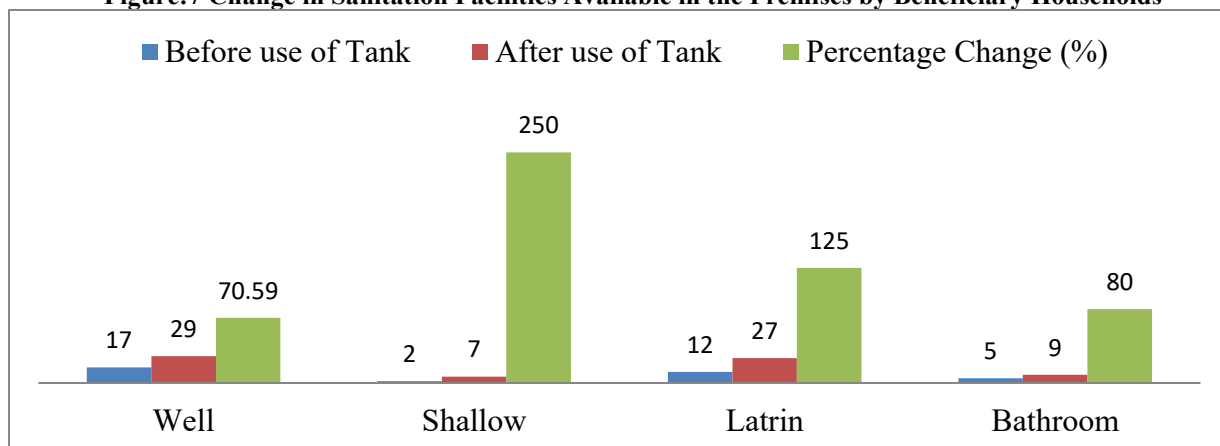
size, size of the workforce, opening of a bank account, savings, and workforce mobility do not cause any significant change in healthcare expenditure. In Figure 6, it is clearly pictured that after use of the tank, there is a positive impact of drinking water facilities.

**Figure: 6 Changes in Sources of Drinking Water for the Beneficiary Households**



Though households are using the same sources for drinking water, after use of the community tank, the income level is changed, which reveals the social changes of the households. In the case of sand wells (-50%) and those who are using community tank (-40%) water and river water (-82.14%) as drinking water, the water has been reduced, and the percentage change is negative.

**Figure:7 Change in Sanitation Facilities Available in the Premises by Beneficiary Households**

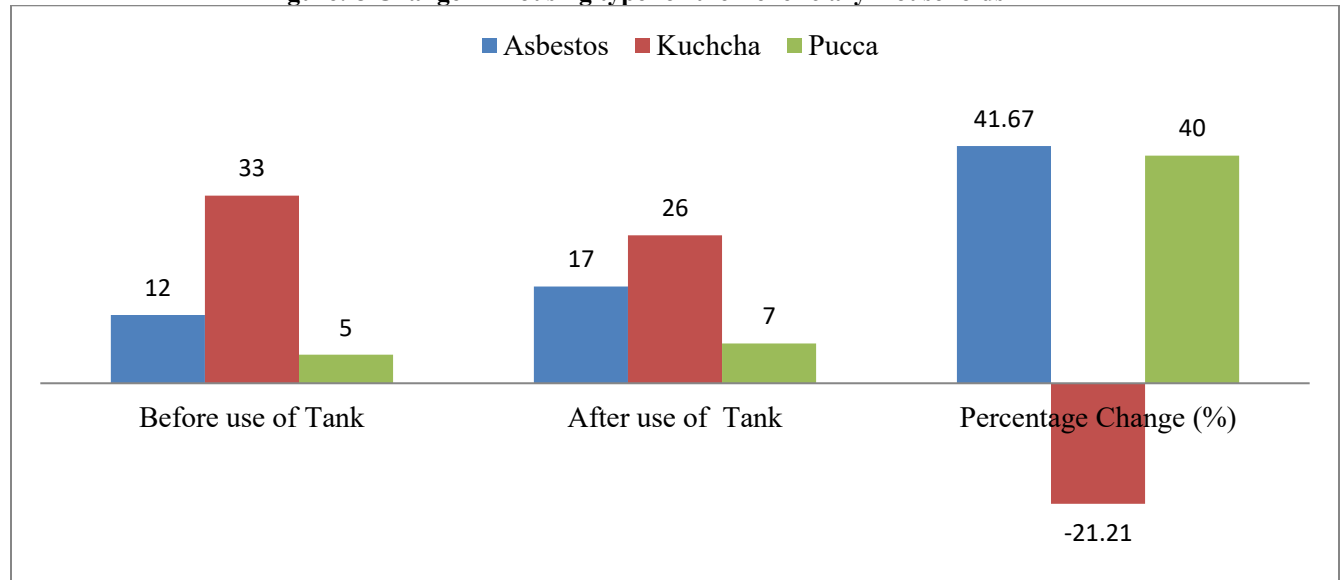


On the other hand, the number of households using hand pumps, tube wells, and wells has increased positively. Figure 7 shows the change of sanitation facilities in the premises of the households. From this table the number of shallow wells, latrines, and bathrooms has increased as before. Due to some eye-catching government policies to change the rural sanitation picture of the rural domiciliary, like Swachh Bharat Abhiyan (SSA), the number of latrines is increasing day by day, which signals effective progress towards the better sanitation of the society.

#### 4.2.3 Impact on Housing of the households

The marginal effect of income and farm size of the household head is statistically significant and positive for changes in housing conditions. Thus, housing conditions have improved after using tank water construction of roads to develop connectivity for business purposes that have educated heads but small farm sizes. It is possible that large farm size shifts focus from a better house to acquiring more farmland using additional income. It is clear from Figure 8 that after use of the tank, the income of the households has been increased significantly, which is reflected in the housing expenditure of the households.

**Figure: 8 Change in Housing type for the Beneficiary Households**



## 5. ECONOMETRIC ANALYSIS OF SOCIO-ECONOMIC IMPACT OF THE COMMUNITY TANKS

An attempt has been made to assess the impact of the community tanks on the aspects of the social and economic scenario of the beneficiary households.

Considering the utility of community tanks on economic aspects of people's lives, an attempt has been made to examine the impact of the community tanks on rural livelihoods. Accordingly, the following functional relationship can be depicted:

Model-I:  $EI = f(IEMP, FSIZE, LVSTK, OBAC)$

Here, EI refers to the economic impact of the community tanks. We have used multiple proxies for different economic impacts that include changes in farm size, production, yield, livestock holdings, savings, etc.

On the contrary, in order to examine the social impacts of the community tanks, the current study envisages the following functional relationships:

Model-II:  $SI = f(IEMP, FSIZE, LVSTK, OBAC)$

Here, SI refers to the social impact of the community tanks. As for economic impact, here also we have taken multiple proxies (educational expenses, consumption expenditure, health care expenditure, housing conditions, sanitation facilities, etc.) to assess the social impacts of the local households.

Table: 1 Summary Statistics of Independent Variables

Variables	Observation	Mean	Standard Deviation	Minimum	Maximum
Employment(IEMP)	50	2.44	1.109	1	5
Farm Size(FSIZE)	50	3.56	2.006	0.22	7
Livestock(LVSTK)	50	4.44	1.567	1	5
Open Bank Account(OBAC)	50	4.72	1.702	1	7

Source: Author's Calculation

Table: 2 Summary Statistics of Dependent Variables

Variables	Observation	Mean	Standard Deviation	Minimum	Maximum
Consumption Expenditure(CON)	50	4.24	1.72	1	7
Expenditure on Education(EDU)	50	2.72	1.75	0	7
Expenditure on Sanitation(SANI)	50	4.8	1.616	1	4
Expenditure on Health (HLTH)	50	3	1.818	1	7
Expenditure on Housing (HOUS)	50	4.46	1.631	1	5

Source: Author's Calculation

Table: 3 Regression Results on Socio-Economic Impact of Community Tank

Independent Variable	Dependent Variable				
	CON	EDU	SANI	HLTH	HOUS
IEMP	0.0342* (-0.0026)	0.0278* (-0.0223)	0.0221* (-0.0056)	0.0456* (-0.0078)	0.0124** (-0.0065)
FSIZE	0.01** (-0.0025)	6.8E-04 (-0.018)	0.036** (-0.0162)	0.0190 (0.0254)	0.03E-03* (0.0E-01)
LVSTK	0.590249 (-0.0256)	0.0312* (-0.00291)	0.0701 (-0.0944)	1.2E-04 (2.8E-01)	-2.5E-04 (1.5E-01)
OBAC	-0.0224 (-0.0204)	2.9E-01 (-0.069)	0.2344 (-0.0871)	0.0416* (-0.0666)	0.3521 (-0.0256)

Source: Author's Calculation

Note: \*\*/\* denotes significance at 1/5 percent level and the values in the parentheses are standard error.

### 5.1 Results and Discussion

It is observed from the Table 3 that increase employment (IEMP) of the people boosting the consumption expenditure(CON) and it is significant at 5% level of significant. That means employment opportunities and consumption expenditure are positively related to each other. In this regards the role of community tanks is very crucial in the rural areas of Mayurbhanj district of Odisha. Similarly, increase in employment opportunity through community tanks have the positive and significant impact on education, expenditure (EDU), sanitation expenses (SANI), and health expenses (HLTH) for the rural people in the district with 5% level of significant. But for the housing expenditure scenario there is 1 percent level of significant, which indicates if income increase through sound employment opportunities people prefer spend more to build new house. Also it is revealed that increase in farm size

(FSIZE) has affected consumption expenditure and sanitation expenditure positively with 1% level of significant. Livestock(LVSTK) and the people who have opened bank account(OBAC) are enjoying better education and health care facilities with 5% level of significant respectively. This is because increase in livestock helps the rural people to support the education expenditure of their children and community tanks help them to raise the number of livestock to boost their livelihood. Increase in employment opportunity, increase in farm size and increase in livestock may help the rural people for financial inclusion which encouraging them to open bank account and as result they can save more money and hence enjoying the better modern socio-economic benefits.

## 6. CONCLUSION AND POLICY SUGGESTION

It is clear from the discussion that significant change has taken place due to the community tank. Small-scale surface water systems, like tanks or ponds, would be the viable alternative source of surface irrigation in the rural area of the Mayurbhanj district of Odisha. But most of such ponds have remained underutilized due to lack of efficient management. Community tanks have multiple effects on the socioeconomic and demographic features of the beneficiary households in the rural arena. The results of the study show that because of access to better connectivity, farmers have managed to increase their crop production and yield substantially. There has also been positive change in cropping patterns observed among the farming communities in the project area as access to agriculture inputs. Road connectivity has also made marketing of agricultural produce easier and provided better returns for their produce. The increased crop production and yields as a result of improvement in connectivity have a positive and significant impact on household annual income and savings and consumption levels. It is observed that the household income from agriculture and allied sectors has increased significantly. It is observed that the households are spending a significant proportion of their income on health, entertainment, and protein-based food products.

The result of community tank utilization settled down some institutional setups and increased the ability of the community to manage communal resources. For better management of community ponds and other surface water bodies, some grassroot-level policies should be implemented. The community people should come forward to manage the community pond, and for this, better training programs should be introduced to understand the rural problems regarding water management for a better future for the rural people. Rural households should be aware of the collective action for the management of surface water, which may promote and enhance the potential benefits at the village level.

## REFERENCES

1. Barlett, P. (2005). *Water Resources and Development in Rural India: An Analysis of Local-Level Management and Governance*. Cambridge University Press.
2. Dreze, J., & Sen, A. (2002). *India: Development and Participation*. Oxford University Press.
3. Duncan, J. (2008). *Water Management and Governance in South Asia: Collective Action and Collective Goods*. Springer.
4. Goverde, P. (2006). *Revitalization of Community-Based Water Management Systems in Rural India*. *Water Policy*, 8(5), 487-501.
5. IPCC. (2014). *Climate Change 2014: Impacts, Adaptation, and Vulnerability*. Cambridge University Press.
6. Joubert, L. (2006). *The Role of Community Tanks in Local Livelihoods and Fisheries Development in Southeast Asia*. *Aquatic Ecosystem Health & Management*, 9(3), 254-267.
7. Kallis, G. (2008). *The Political Economy of Water Scarcity: Community Tanks as an Adaptation Strategy to Climate Change*. *Environmental Economics*, 39(2), 101-117.
8. Mani, R., & Nambirajan, A. (2014). *Livelihood Diversification in the Rural Economy: The Role of Water Tanks*. *Journal of Development Studies*, 50(12), 1496-1514.
9. Moench, M., & Dixit, A. (2004). *Water and the Political Economy of Rural Development*. Earthscan Publishers.
10. Ninan, K. N. (2007). *Water Resources and Development: An Economic Analysis*. Oxford University Press.
11. Ramaswamy, V. (2003). *Rejuvenation of Water Bodies in South India: The Role of Community Participation*. *Journal of Rural Development*, 22(2), 139-156.
12. Shah, T. (2006). *Managing the Commons: A New Approach to Rural Water Systems*. *World Development*, 34(5), 938-957.
13. Shiva, V. (2002). *Water Wars: Privatization, Pollution, and Profit*. South End Press.