ISSN (e): 2250 – 3005 || Volume, 08 || Issue, 8|| August – 2018 ||
International Journal of Computational Engineering Research (IJCER)

Impact of Maithon Dam – A Micro Level Study on Salanpur Block of Paschim Bardhaman District, West Bengal

Subhendu Ghosh[1], Sumanta Bid[2], Chumki Mondal[3]
[1]*Research Scholar*
Department of Geography
The University of Burdwan, Golapbag – 713 104
Purba Bardhaman, West Bengal, India
[2]*Research Fellow (UGC-SRF)*
Department of Geography
The University of Burdwan, Golapbag – 713104
Purba Bardhaman, West Bengal, India
[3]*M.A. in Geography*
Kazi Nazrul University, Paschim Bardhaman
Corresponding Author: Subhendu Ghosh

ABSTRACT
Dam is a barrier across the flowing river. This activity was first introduced at the beginning phase of human civilization and starts to harness the nature. Though dam has several beneficial aspects but could not avoid its negative impact. The Maithon dam has installed in 1957 across the river Barakar as a multipurpose river project under the authority of Damodar Valley Corporation (DVC) with the aim of flood control, irrigation, fishing, domestic water supply etc. but still now it cannot manages its several negative impact such as soil erosion, ecological disturbances, forest loss, loss of flora and fauna, inundation of agricultural land settlement, population displacement, health hazard, human stress and strain etc. The present investigation conducts a micro level study on physical, socio-cultural and economic impact of the dam based on field survey and various secondary data on Salanpur Block located in the immediate vicinity of the dam. The result indicates that some *mouzas* of this Block are totally submerged under the dam water and many villages are partly inundates throughout the year. Environmental degradation is a crucial problem of the area caused by the dam. On contrary loss of agricultural land is increased day by day.
KEY WORDS: Maithon Dam, Impact Analysis, Damodar Valley Corporation (DVC), Multipurpose Project, Barakar River, Environmental Degradation, Hazard

---

Date of Submission: 08-08-2018 Date of acceptance: 23-08-2018

I. INTRODUCTION

Large dam is a barrier, built across a river to hold its flow and produce electricity through controlled regulation of flow by means of gravity. Dams are also used to control flood, irrigation purpose, for fishing activities etc. Dams are considered as one of the most significant human interventions in the hydrological cycle. They have supported human socio-economic development through provision of water for drinking, irrigation and electricity, but simultaneously they have had a considerable impact on fresh water ecosystems (McCartney, 2009). A section of the present technocrats believe that more dams will be needed in future to meet the growing demand of the increasing population. But there are many social and economic arguments against dams, and after all, many of these arguments support the fact that dams, particularly large dams - new or old are always against the natural processes and ecological balance. Dams have produced ever major ecological changes in river ecosystems along with imposition of impact on both ecosystems upstream and downstream. Flooding upstream by dams results in the permanent destruction of terrestrial ecosystems through inundation. All terrestrial plants and animals disappear from the submerged area. Reservoirs extend shelter and habitat for waterborne materials including sediment and microbial germs and obstruct migration pathways for some aquatic species. Many of these changes are immediate and obvious (McCartney et. al, 2001). The present work is an endeavor to look into the impact of the Maithon Dam on physical, social and economic attributes on Salanpur Block of Paschim Bardhaman District.

II. LOCATION OF THE STUDY AREA

The area under review is the Salanpur Block. Salanpur is a Community Development Block that forms an administrative division in Asansol Sub-Division of Paschim Barddhaman District in West Bengal. Geographical extension of this area is 23°43′40″ N to 23°52′40″ N latitude and 86°48′03″ E to 86°56′57″ E longitude. It is located 134 km from Barddhaman, the district headquarter. Salanpur Block has an area of 135.05 km². The Block is covered by 1 *Panchayat Samity*, 11 *Gram Panchayats*, 96 *Gram Sansads*, 74 *mouzas* and 69 inhabited villages. Chittaranjan and Salanpur Police Stations serve this Block. Headquarters of this Block is at Rupnarayanpur (District Census Handbook: Barddhaman, 2011). The area is bounded by the Jamtara and Nala Blocks of Jamtara District in Jharkhand, on the north, Barabani Block on the east, Asansol (Municipal Corporation) and after that Neturia Block of Purulia District on the south and Nirsa and Baliapur Blocks of Dhanbad District in Jharkhand State, on the west. Maithon dam and barrage demarcates the western margin of the Block, Ajay River passes through the northern margin and the Damodar River passes through the southern margin of the area under study.

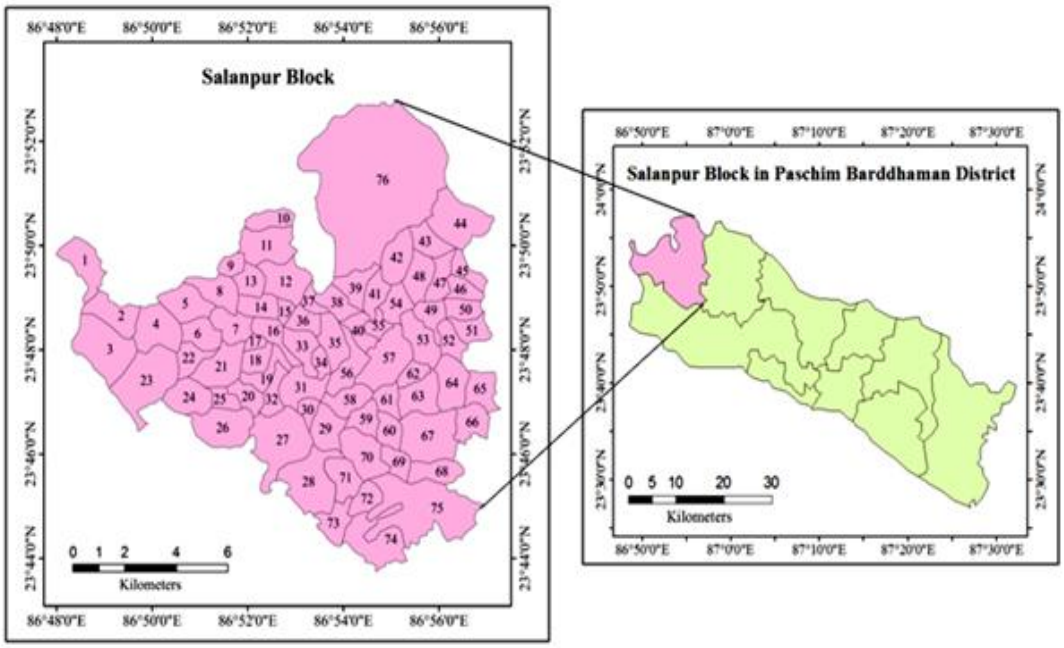


Figure 1. Location of the study area

III. METHODOLOGY

The methodology incorporates the collection of data and information available from various relevant sources. The data has been categorized and classified in accordance with their relevance and importance to reach the stated objectives. The data and information, qualitative and quantitative, descriptive, numerical and digital, have logically been categorized as secondary data, which are published and retrieved in various formats like records, reports, memoirs, census statistics and gazetteers. The maps, images and photographs of different times are also incorporated. The data generated through intensive field visits, both through oral interviews with the respondents and with the help of the questionnaire schedule, have been assorted in accordance with the objectives and to satisfy various aspects purposefully put in the research objectives. The maps have been made with the help of Landsat data using Arc GIS software of version 10.2.1 and Erdas Imagine software of Version 14.00.

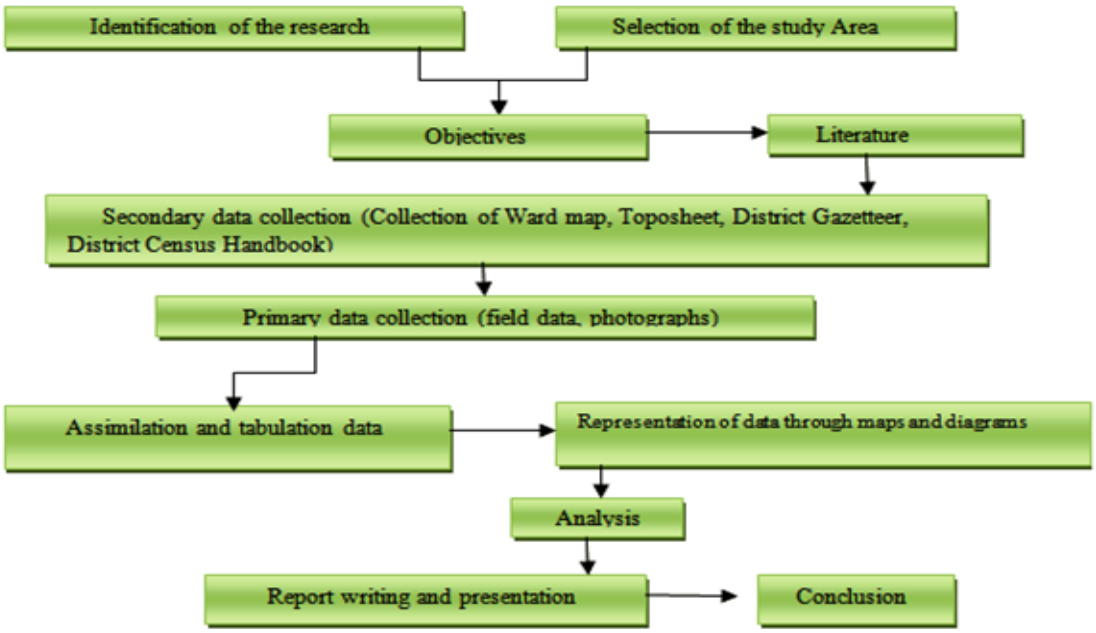


Figure 2. Flow chart of methodology

IV. REGIONAL SETTING

The area under review is formed of Archaean (Pre-Cambrian) rocks containing a multitude of variations of granitic and schistose which had crystallized at least 900 million year ago. It can hardly picture the events of the earliest part of the Pre Cambrian era but guess that it was essentially a period of igneous activity, out pouring of the magma through the weaker zones of the earth's crust upon the irregular surface of the earth. The landscape was a vast stretch of igneous rocks. As the lithosphere became cooler, water accumulated in depressions giving rise to seas and geosynclines. Diastrophic movements then gave birth too many generations of mountain ranges. As the older mountains were worn out, newer ones sprang up out of the eroded products of the earlier ones. But these mountains have been eroded down to their roots and a number of buried domal structures of varying dimensions have been detected below the alluvium. These structures are possibly only eroded residues of the Archaean basement. The exposed portion of the shield displays in Chittaranjan, Salanpur areas, similar features of sub-aerial denudation – a peneplaned landscape with dome shaped residual mounds (Geological Survey of India, 2002).

The Salanpur Block is an extended portion of the hill ranges of Central India and Chhotanagpur plateau in the north. It is characterized by the narrow strip of rocky and undulating land with lateritic soils between the Ajay River on the north and the Damodar River on the south, with the Barakar as a River boundary line on the west. The highland range rises at places to over 60 metres and runs to the south of the Ajay River. The general slope is from north-west to south-east. Most of the streams of the region fall into the Damodar River which flows towards the south-east direction. The laterite soil mostly occurs in the region. The land surface is generally covered with red loamy clay and sand (Burdwan District Gazetteer, 1994).

Climate of the area is tropical, weather is hot and humid. There is marked difference between the winter and the summer temperatures. The average summer temperature is 30°C and average winter temperature is 14°C. The hottest month is May and the coldest month is January. In monsoon period from June to September wind blows from the south-west direction recognized as south-west monsoon. During the post-monsoon season the weather is fine except for early morning ground mists. During winter, i.e. from December to February winds are mainly northerly or north-easterly and the clear or patchily clouded sky invigorates light surface wind (occasionally gusty in the afternoons). Temperatures are fairly cool between winter and spring. Welcome north winds start blowing in the mornings while the evenings are pleasant with the south breeze (Burdwan District Gazetteer, 1994).

Average annual rainfall is about 1400 mm. Rainfall during the monsoon period (June to September) constitutes 75 per cent of the annual rainfall. On an average there are 70 rainy days in a year. The most prominent special weather phenomena of the district are the Nor'westers, the Bengali equivalent of which is *Kalbaisakhi*. Most of them strike with speed of 65 to 100 km. per hour. Rainfall ranging from 10 mm. to 50 mm. at times and a consequent fall of temperature has been observed. '*Kalbaisakhi'* generally burst during afternoon and dusk (District Census Handbook of Bardhaman, 2011).

The area has three main river systems, the Damodar, the Barakar and the Ajay. The Damodar as master stream is flowing from north-west to south-east along the south boundary of the Upland. The Barakar is flowing north to south along the western side. The Ajay River is flowing from north-west to south-east along the northern boundary. Nunia, a small stream, does not carry much water even during the rainy season in the Salanpur Block (Burdwan District Gazetteer, 1994). Constructions of hydro electric projects have ensured that water is available even in relatively dry areas but Salanpur Block does not get any benefit from the major irrigation projects of the district and mainly depends on tanks. In the eastern parts, numerous tanks can be found and they are the mainstay of the highland and double-cropped areas.

The Maithan Dam has formed a large reservoir at the western periphery of the block. The Maithan Dam is a composite structure of concrete and earth. The maximum height of the main earth dam is 49.4 meters and that of the concrete dam is about 45 meters above diversion channel and 56.4 meters above the lowest foundation. It has a total power generating capacity of 60,000 KW with 3 units of 20,000 KW each. Rupnarayanpur and Chittaranjan now stand on the fringe of this vast reservoir and draws water and hydro electric power from it (District Census Handbook of Barddhaman, 2011).

Soil texture refers to the relative proportion of various soil particles like sand, silt and clay (Rai, 1995: 34, Daji, 1996: 98). Texture controls the movement of water and air in the soil. It also influences the nutrient and moisture holding capacity of a soil. Root penetration is also controlled by texture. Coarse sandy soils are very permeable, fine clay particles hold most of the plant nutrients but are not permeable to air, water and plant root. Medium textured soil is most desirable because it holds nutrient, air and water also and allowed to move (Rai, 1995: 38). The area is mostly covered by Intra-zonal type of soil. Mainly sandy clay loam and gravelly sandy loam with very low organic carbon cover the area. Sandy clay loam soil covering 15.47% of the area which is less fine than the clay loam. It contains 20% to 35% clay, less than 28% silt and 45% or more sand. It is suitable for all crops. The south eastern part of the area is covered with this type of soil. Gravelly sandy loam soil is found in the north-west corner near the Maithan Dam on the residual hilly area. It covers only 3.27% area of the area under study. Due to forest cover organic matter is high in this soil which increases the fertility. Permeability is found highest in this soil, so it is very less suitable for cultivation (Burdwan District Gazetteer, 1994).

The Forests in Salanpur Block is categorized as the tropical dry deciduous type where the principal flora include *Sal* (*Shorea robusta)*, *Mahua* (*Madhuea latifolia*), *Palas* (*Bulea Monosperma*), *Bans* (*Bambusa arundinacea*), *Arjun* (*Terminalia Arjuna*) *Shireesh (Albizia saman)*, *Kend* (*Diospyros melanoxylon*) etc. In the wasteland, scrubs and bushes are found (Burdwan District Gazetteer, 1994).

V. THE MAITHON DAM

5.1. History of the Dam

Government of India had been concerned with the problem of flood in Bengal since 1852. The heavy damage by the floods in pre-independence period, made post-independent Government of India to plan a detail roadmap to control the flood. After Independence, two River commissions and a Central flood control board were set up to implement the flood control mechanism. It included building dams, irrigation canals, forestation and so on (https://ejatlas.org/country/india).

Damodar Valley Corporation (DVC) was created in July 1948 as an Act of Parliament to control the floods occurred by Damodor River and its tributaries. The new corporation was given responsibility to control flood in Bengal and Bihar. The project was initially aimed to build four large dams and Maithon dam was one of them, three hydroelectric stations one thermal power station and a barrage with a network of canals and tributaries (https://ejatlas.org/country/india).

The Maithon dam was primarily designed to control flood. It aimed to cultivate 270,000 acres of land and hydroelectric generation by this dam was estimated to be 164,000,000 KWH and the dam is located about 25 km from Asansol, District Burdaman, and West Bengal. The dam and the hydroelectricity unit are operated by Damodar Valley Corporation (DVC). It has three hydroelectricity generation units with a design capacity of 60 MW. The first unit was commissioned in 1957 and the last in 1958 (https://ejatlas.org/country/india).

5.2. Project Design

The Maithon Dam was constructed over the River Barakar with a single Reservoir. The dam was constructed with two major objectives: I) Irrigate 270,000 acres of cultivated land and II) hydroelectric generations. The dam has three hydroelectricity generation units with a design capacity of 60 MW. The other purposes were to moderate flood, supplying drinking water for the human and cattle consumption as the area is very much susceptible to domestic water crisis during non monsoon periods, provide job opportunities to the local people etc. Starting date of the dam was 1st January, 1956 and was invested 69 crores for this project (http://idup.gov.in).

Maithon Dam and Hydroelectric Project: At a Glance

Salient features of the Maithon Dam and Maithon Hydroelectric Project is shown in table 1 and table 2 respectively.

Name of the Dam	Maithon Dam
Construction on River	Barakar
Year of completion	1957
Operating and maintenance agency	Damodar Valley Corporation
Seismic Zone	Seismic Zone II
Type of Dam	Earthen Dam
Maximum height foundation	56.08 meter
Length of the dam	4426 meter
Design flood	14160 cumec
Total volume content of the dam	Concrete volume 243.698 TCM Earth volume 3475.685 TCM
Crest level of spillway	343.9 meter
Spillway capacity	14160 cumec
Spillway Gates number	12

Table 1: Salient feature of Maithon Dam

Source: Water Resource Information System, 2016

Name of The Power House	Maithon Power House
Hydroelectric Development Type	Storage
Status of Powerhouse	Operational
Establishment Year	1957
Minimum Draw Down Level for Powerhouse (M)	132.5
Firm Power (MW)	16
Number of Turbines	3
Capacity Per Turbine (MW)	2*20+1*23.2
Total Installed Capacity (MW)	63.2
Types of Turbine	Francis
Turbine Make	Neyrpic-France
Generator Make	Siemens West Germany
Number Of Penstock	3
Penstock Size(M)	4.30
Length of Penstock(M)	3.96

Table 2. Salient feature of Maithon Hydroelectric Project

Source. Water Resource Information System, 2016

5.3. Areal Changes of Maithon Reservoir

Maithon reservoir extends between latitude23°46′34.12″ north and longitude 85°09′16.26″ east, to latitude 24°32′09.80″north and longitude 86°53′19.20″ east. The dam has a height of 56.08 m above the lowest river bed level and a total length of 4426.76 m comprising 4064.35m long earthen embankment and 362.41 m long concrete overflow section. The reservoir has a gross storage capacity of 1,093.54 Mm^3 and a live storage capacity of 441.64 Mm^3.The project was constructed between 1951 and 1957. The spillway, comprising 12 bays with gates 12.19 m wide and 12.50 m high gates over Ogee profile, was originally designed to pass a maximum discharge 13,592 m^3/sec (Central Water Commission Report, 2017). It is very clear from the given table (table 3) and figure (Figure 3) that the area of the Maithon reservoir is not static one, it always changes. It is evident from the mentioned table and figure that in 1972 the area of the reservoir was 6.41 km^2 which is decreased to 6.22 km^2 in 1984 and further decreased to 5.57 km^2 in 1994. It is also evident that 2004 has seen a drastic positive change in area coverage, which is 8.14 km^2 due to heavy rainfall in the upper catchment area and the area is decreased to 7.99 km^2 in 2014. So, from this analysis it is clear that 1994 onwards the area of the reservoir is increasing with the cost of inundation of valuable land and natural vegetation cover.

Table 3. Areal change of Maithon Reservoir from 1972 to 2014

Name of the Reservoir	Year	Area
Maithon	1972	6.41
	1984	6.22
	1994	5.57
	2004	8.14
	2014	7.79

Source: Calculated by the Authors

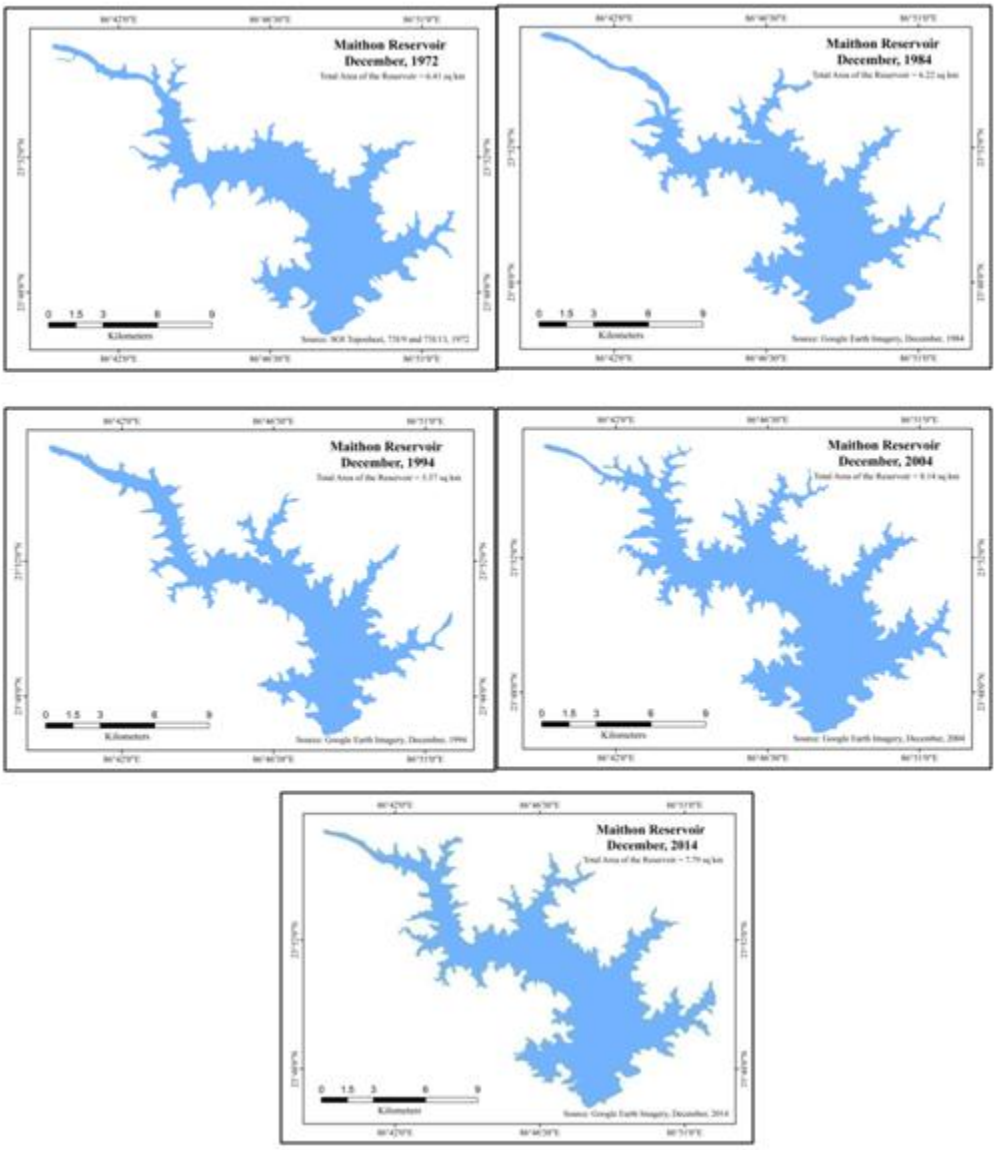


Figure 3. Changing coverage of Maithon Reservoir from 1972 to 2014

VI. IMPACT ON PHYSICAL ENVIRONMENT

Impacts of large dams are manifold and most of them are deep rooted. Some of the impacts are direct and often known to common people, while some are indirect but often extreme. The impacts of the Maithon dam on the physical-ecological components of the area will be adequately analyzed with the elements of physical environment like topography, land, forest, ecosystem, biodiversity and climate.

6.1 Impact on land

Maithon reservoir occupies 65 km^2 of area, out of this land, the 3 *mouza*s of Salanpur Block namely Ghatkul, Gamarkuri, Sarkuri, have been submerged totally under water and it constitute 699.08 hectares area and some part of the other *mouzas* also submerged which is evident in the figure 4. Most of the people of that *mouzas* who lost the major share of the fertile agricultural land for construction of the reservoir, were the tribal under the category of Scheduled Tribe and people under the category Scheduled Caste, though a sizeable number of people also came from the upper strata of the people. The loss of land for a person who is completely dependent upon the production from land or physical labour, or gathering of resources from the rural commons having no alternative sources of income, are the tribal poor of the western part of the Block, they were the easy target of the planners and decision makers, because, this section of the people were illiterate, poor and having no experience of even how to apply for compensation and how to protest against the construction of the dam. Some people also fought against the dam builders but ultimately became defeated.

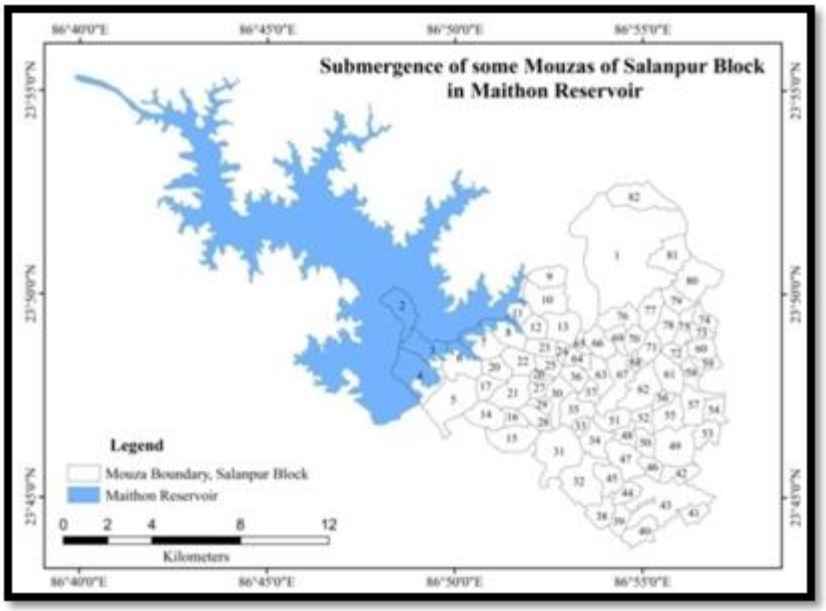


Figure 4. Inundated *mouzas* of Salanpur Block from the Maithon Dam

6.2 Impact on vegetation

The study area was covered by old dense forest with indigenous tree species like *Sal* (*Shorea robusta)*, *Mahua* (*Madhuea latifolia*), *Palas* (*Bulea monosperma*), *Bans* (*Bambusa arundinacea*), *Arjun* (*Terminalia arjuna*) *Shireesh (Albizia saman)*, *Kend* (*Diospyros melanoxylon*) etc. Though the legal owner of the forest is the Government, but the economy of the local people had a dependence upon the forests with the supply of fuel wood, timber, fodder and other consumable materials like fruits, flowers and roots. In a simple sense, the forests of the area were considered as most dependable container of resources without any exchange of price. Particularly in the time of rainy season, when maximum of the household's food stock became exhausted and they had to face starvation, they could collect very nutritious mushrooms from the forest floor. Thus the food materials supplied by these forests to the local people now degraded. It was enormous and hard to make a balance sheet for the loss due to non existence of forests. In addition, the people were to some extent directly dependent upon the small wild animals, birds and rodents and even snakes for meat and even hunting of these animals were part of their festival. These animals have become almost extinct and purchasing of meat from markets is a rare incident.

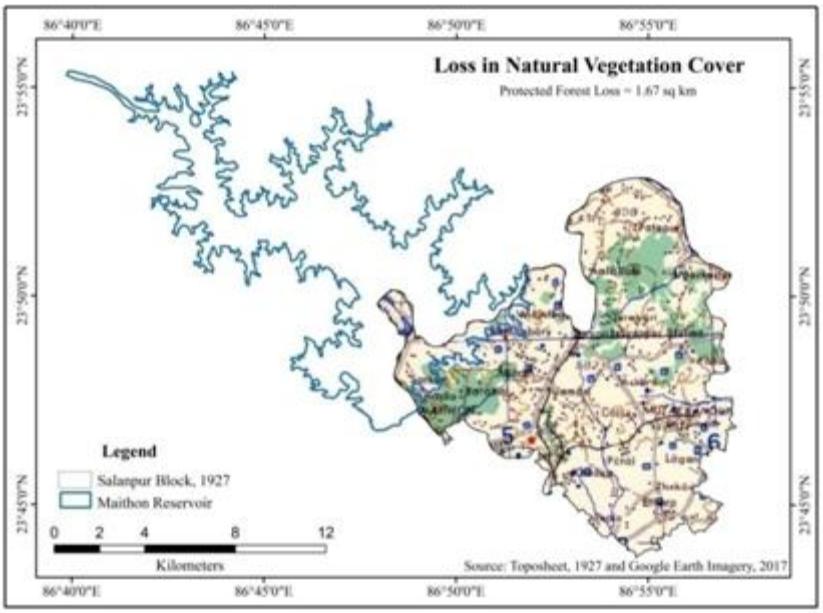


Figure 5. Loss of vegetation covers in Salanpur Block from the Maithon Dam

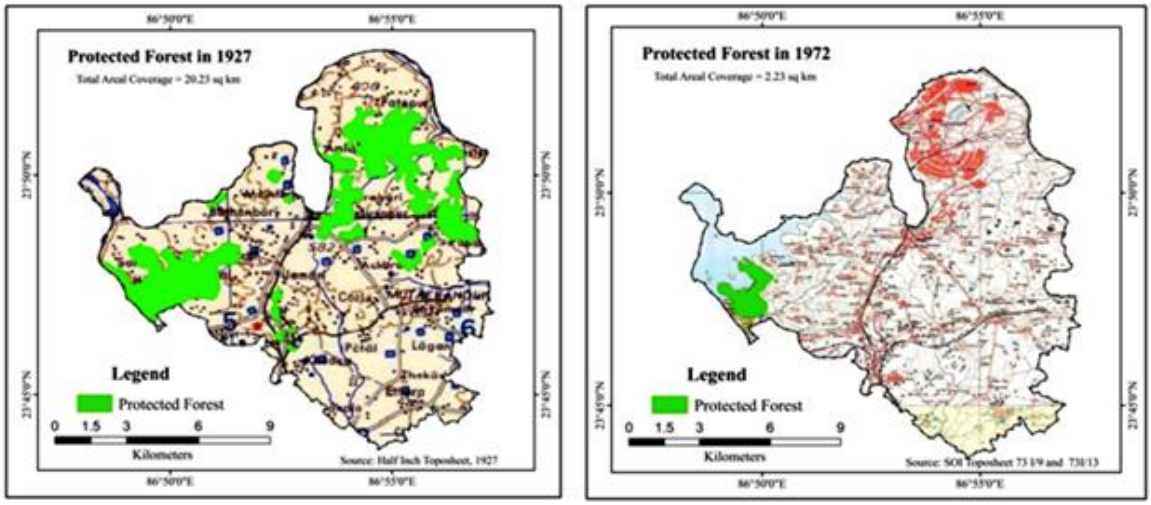
A household needs at least l0 kg of fuel wood for cooking purpose, which they had the opportunity to collect previously from forest without any payment. But now a household has to pay the amount mentioned daily with

current payment either for fuel wood , brought from markets or its alternative as coal or kerosene and LPG, which are less suitable than fuel wood in health ground.

Figure 5 signifies that due to the construction of the Maithon Dam 1.67 km^2 Protected Forest areas have been submerged into the reservoir which has direct negative impact on ecology of that area.

Figure 6 clearly exhibits a decline trend of forest cover in post dam situation. It is observed that in 1927 total areal coverage of protected forest was 20.23 km^2 which is decreased into 2.23 km^2 in 1972. It signifies that the dam is constructed with the costs of valuable natural resources.

Figure 6. Changes of forest area from 1927 to 1972



6.3 Impact on local climate

As the reservoir stores huge volume of water for the whole year, it must have some definite effects upon the local climate in micro scale through controlling humidity and temperature. There is a possibility of methane (CH_4) formation under the stagnant water of the reservoir due to decomposition of biomass (WCD Report 2000:75-77).

While interviewing the villagers of the Salanpur Block, they responded that they suffer from the diseases related to fluctuation in humidity like fever, cough and cold etc. and water borne diseases like dysentery and diarrhea. It is also an important fact that the old aged persons are often familiar with torrential rain and also seasonal rainfall when there was vast vegetative cover but after removal of that rainfall is decreased with time.

6.4 Impact on surface and sub-surface hydrology

Dams comprise obstacles for longitudinal exchanges along fluvial systems and so result in “discontinuities” in the river system (Ward and Stanford 1995). As the area is located at the downstream section of the Barakar River, and were naturally endowed with water resources and sub-surface aquifers were naturally rich with water due to regular flow of the river. The dam as a barrier made over the river has disturbed this natural supply of water, as water below the dam has been artificially and totally stopped.

Besides, as vegetation is one of the agents of holding soil moisture and water, their disappearances have affected both the surface water and the water just below the soil. The conversion of river bed into agricultural field is another cause of reduction in the humidity of the soil and stopping of the flow of water, which was the source of replenishment of sub-surface water. Thus, absence of forest and absence of river, jointly affected the water resource of the area. According to field survey, all the dug-wells and the natural courses of river become dried up in the summer, even the deep tube wells established by the government sometimes fail in the summer due to depth.

VII.IMPACT ON SOCIO-ECONOMIC ENVIRONMENT

Dams have an immediate spatial social impact far beyond the construction activities and the associated displacement. Dams' social impact reach upstream populations, e.g. via restrictions on water us in order to fill the reservoir (Duflo and Pande, 2007) The Socio-economic impacts of the Maithon dam on the area include the economic loss incurred due to submergence of land and forest in the area and a large number of people have been affected as they had to be ousted from their land and habitats for the sake of the construction of the dam and reservoir. Though impacts on physical and economic environment are perceptible and logically quantifiable, but the social impacts, though imperceptible, are more severe and deep rooted, which takes on the body and mind of the sufferers.

7.1 Impact on economy

The area under study has experienced a number of economic losses due to the construction of the Dam, some of these economic losses are direct and some are indirect. Direct economic losses are much related with the construction period of the dam, such as acquisition of land, forests, ponds, household etc. which they had to handover to the dam building authority. Indirect losses are mainly the economic losses due to the scarcity of water, clearance of forest, reclamation of land and a long term effect on the economy re1ated to crop production. The economic loses thus may be explained with the consideration of loss of land, loss of forest, decreased yield of crops, loss from fishing.

It is evident from the field survey that 17% of the villagers who were engaged in fishing before dam construction now have shifted their occupation as daily laborers. It is also obvious that the tribal were forced to shift their leaf gathering practice as the forest has been submerged into the reservoir.

7.2 Impact on yield of crops

The selected area depended on natural supply of water from rivers and run off. Even the relatively upland soils were moist enough for growth of annual crops, mainly paddy. But the present generation faces a decreased rate of yield from those plots due to severe shortage of moisture but having no chance of irrigation. Crop failure in those parts of the land has become a regular event. On the other side, the agricultural plots neighboring to the foot of the Dam wall receive seepage water from the reservoir, keeping the lands moist for the whole year. New High Yielding Varieties of paddy culture has recently been introduced in these lands. But the fact is that, these varieties require higher rate of application of chemical fertilizer and pesticide which increase the actual expenditure. The distribution of this moist fertile land is very uneven. This also affects the social imbalance of the society.

It is evident from the oral interviews with the old villagers of the area that before the construction of dam double cropping and multi cropping system is practiced with the help of river irrigation. But after the construction of Maithon dam natural flow of the river Barakar is choked. As a result farmers of the area are now facing water crisis as the water is stored into the reservoir. It is also obvious that the production of crops mainly the rice production has decreased from the earlier. Before the construction of dam the production of rice was 24 quintals per acre, but after the construction of dam it is decreased to 17 quintals per acre.

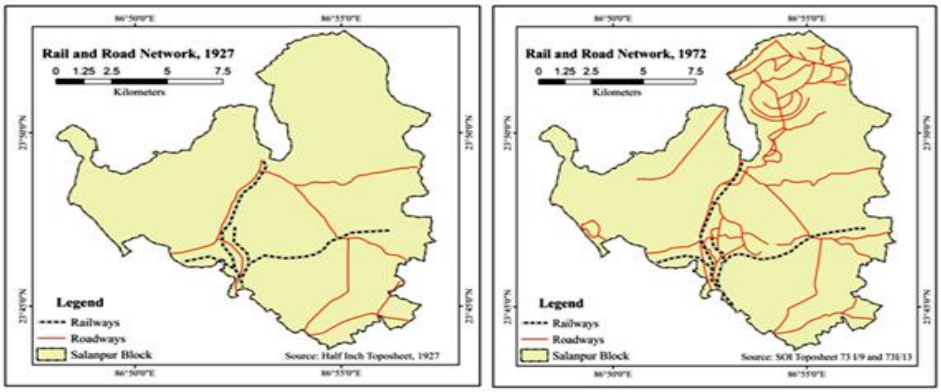
7.3 Displacement

Displacement of people has some social impact. The number of displaced households is much. People from Ghatkul, Gamarkuri, Sarkuri *mouzas* on which the Dam was constructed totally displaced. From the field survey it is observed that average 60-70 percent peoples displaced from that *mouzas* to the nearby villages and rest peoples were migrated to the outside. Thus, resettlement in another type of environment did affect the people. Therefore impact of displacement was severe.

7.4 Impact on Communication

Before construction of the dam the area was less connected with other area. But after the dam construction the transportation system became more developed. Peoples from other area come to that area for tourism purpose, job purpose and others. From the field survey the responses are positive about the connectivity. The remote villages become an accessible village because of the dam is constructed at the connected point of two states, West Bengal and Jharkhand and acts as a linkage of communication. Good communication system also increases strong social bonding and economic development. Figure 7 shows the connectivity of the area in both pre dam and post dam period.

Figure 7. Changes in connectivity from 1927 to 1972



7.5 Rehabilitation

A sizeable number of families evicted from Ghatkul, Sarkuri, Gamarkuri *mouza*s which were totally submerged due to construction of dam, were rehabilitated in the *mouzas* like Halda, Bathanbari, Sidhabari and other *mouzas* which not only increase the number of population of those *mouzas* but definitely created an environment of pressing upon the limited resources, mainly land and water on those areas. The term rehabilitation was never full proof, but a partial arrangement of settlement only. A recent survey of 50 large dams around the world found that resettlers seldom see their living conditions improved, and in fact often slip further into poverty (Cernea, 2003; Scudder, 2005) The people assimilated in those *mouzas* definitely had some differences in cultural activities and social aspects. So, de-culturation is one of the major problems. This has affected the rehabilitated people a feeling of alienation.

7.6 Compensation

Compensation defined as the total amount of monetary and non monetary pay provided to make up damage, trouble etc. At the time of construction the dam the people who were displaced had provided money and job exchange for their land and house. But a few number of people got compensation, although amount of money was less. This became uneasy to spend livelihood of the people. From the field survey it had been cleared that at those time they had only received as per household 3 lakhs with no land for re-housing facilities.

7.7 Stress and Strain

When a developmental project extends no benefit to a section of the People who have lost everything to give way to the project, should have to bear stress and strain, both in body and mind to a great extent. The people, after the completion of the Dam, became almost silent instead of agitation that all the undesired outcomes of the Dam should have to be tolerated. As these *mouzas* which are located near the Dam wall made up of earth and stone, they have a fear in their mind for all the rainy season that if the Dam wall is broken, they should have to be wiped out. This experience and feelings add much commonly on their mind but they keep fearful. Even the people who are residing on the sides of the outlet channel, do not go to bed for the whole night when the reservoir is completely filled with water and outlet channel releases water with great force. Thus all the bio-physical and economic impacts are directly consequent upon their body and mind enhancing stress and strain.

VIII. CONCLUSION

The very primary objective of building the Maithon Dam was irrigation. The command area is the main beneficiary of this project. But the areas does not receive the proper benefit of the project due to two main causes - i) about 40% of water regulated through canals is lost midway through seepage and percolation and ii) particularly the branch canals do not get water in right time due to delayed operation. The owners of the lowland are sometimes benefited with seepage water, but sometime it creates water logging which reduces crop yields. Unregulated flow of water increases soil erosion and affects the chemical composition of soil through addition of salinity. As the area is predominantly an agricultural one, irrigation water should be utilized to its maxim.

A number of problems related to the study area have observed by the researchers. The Maithon Dam is mainly an irrigation dam and the most important problem related to this dam is the persistent gap between the created irrigation potential and the problem of the distribution of benefits. Problem of soil erosion is another important problem. Severe soil erosion is evident in the catchment area of the dam. The type of soil and the character of the topography augment the rate of soil erosion. Regular irrigation in the command area also expedites soil erosion. Water logging is a prominent problem observed in the low-lying pockets of the command area and in the lower reaches of the valley. Prolonged water logging changes the structure and chemistry of the soil. Deforestation in the upper catchment section is a vital problem. Extensive tract of the area has been deforested and degraded with little possibility of regeneration of indigenous species. Poverty is most extreme problem of the area. Majority of the poor are the landless people and a certain number of them include the people who have been displaced. Unemployment, illiteracy, crop failure, inequality in the distribution of irrigation water and flooding are some other problems concerning ·the study area.

Summarizing all the discussion, it may be concluded that Maithon dam has exerted discriminatory effects in the downstream sections of the study area. Being predominately an agricultural area, the sections need some plan to bring a balanced development of the whole area. Active participation of the local people in the development programme is needed. After all the discussion, it may be concluded that Maithon dam has many impacts; it may be positive or negative in the study area. Being predominately a primary activities dominant area, the sections need some plan to bring a balanced development of the whole area. Active participation of the local people in the development programme is needed.

REFERENCE

[1]. Census of India, District Census Handbook: Burdwan. 1961, 1971, 1981, 1991, 2001 and 2011.
[2]. Daji, J. A. A Text Book of Soil Science. Media promoters & publishers Pvt. Ltd., Mumbai. 1996.
[3]. Geological Survey of India, 2002. https://mines.gov.in/writereaddata/UploadFile/GSI.pdf
[4]. McCartney. M.P, Sullivan. C, and Acreman, M.C. Ecosystem Impacts of Large Dams Prepared for IUCN / UNEP / WCD, No. 2. 2001.
[5]. Rai, M. M. Principles of Soil Science. Macmillan India Limited, New Delhi. 1995.
[6]. World Commission on Dams. Dams and Development: A New Framework for Decesion - Making. London: Earthscan Publications Ltd. 2000.
[7]. https://ejatlas.org/country/india
[8]. http://www.india-wris.nrsc.gov.in
[9]. http://idup.gov.in
[10]. Govt. of West Bengal. Bengal District Gazetteer: Burdwan, Bengal Secretariat Book Depot, Calcutta. 1994.
[11]. Central Water Commission. Design Flood Study of Maithon Dam: Dam Rehabilitation and Improvement Project (DRIP) , Government of India. 2017. Retrieved from http://idup.gov.in/site/writereaddata/siteContent/IDUP-14-09-17/Maithon-Dam-Design-Flood-Estimation.pdf
[12]. Duflo, E., Pande, R., Dams, Q. J. Econ. 2007.122 (2), 601-646, http://dx.doi.org/10.1162/qjec.122.2.601
[13]. Cernea, M.M., For a New Economics of Resettlement: A Sociological Critique of the Compensation Principle. International Social Science Journal. 55 (175), 37–45. 2003.
[14]. World Commission on Dams, Social Impact Assessment: WCD Thematic Review V. 2. Environmental and Social Assessment for Large Dams. World Commission on Dams, Cape Town. 2000.
[15]. Ward, J.V., Stanford, J. A. Ecological Connectivity in Alluvial River Ecosystems and its Disruption by Flow Regulation. Regulated Rivers: Research and Management, 11, 105-119. 1995.
[16]. McCartney, M.P. Living with Dams: Managing the Environmental Impacts. Water Policy, 11 (1): 121-139. 2009.

Subhendu Ghosh"Impact Of Maithon Dam – A Micro Level Study On Salanpur Block Of Paschim Bardhaman District, West Bengal" International Journal of Computational Engineering Research (IJCER), vol. 08, no. 08, 2018, pp. 51-64.