Chapter 9

9.0 SUMMARY AND CONCLUSION

The present study entitled Impact of Kangsabati Dam in Some Selected mouzas of Puruliya and Bankura Districts, West Bengal has been an attempt to investigate into the question whether the dam constructed across the river Kangsabati around Mukutmonipur in the district of Bankura in West Bengal has created environmentally, socially and economically discriminatory effects upon the communities living in the immediate upstream and downstream sections of the Kangsabati Dam at Mukutmonipur in one hand, and to find out the possibilities that whether such large scale interventions in general could be replaced by any viable alternatives on the other hand.

A river generally shapes the entire area from which it receives its water and it is easily understandable that the downstream areas will be always endowed better with the economic and social effects of water availability, because, from the head to the mouth of a river, greater the volume of flow greater the availability of water for economic and domestic use. But the advantage and disadvantages vary in a gradual manner from point to point, and the differences between upstream and downstream sections of any given point are marginal and in most cases imperceptible. When the free flow of water is impeded at a given point, then the differences remain no longer imperceptible or marginal, but become cardinal and prominent leading to social and economic discrimination between the communities living in the upstream and the
downstream sections from the point at which the intervention is made. This has been considered as a working hypothesis of the present study.

The river Kangsabati had a profound effect upon the biophysical and socio-economic environment of the study area. In fact the river basin as a whole was an integrated ecosystem before the construction of Dam which was built mainly to irrigate the lands on the two sides of the river measuring an area of 6110 km². Impedimentation on river Kangsabati has divided the integrity of the ecosystem actively functioning throughout the basin. The upstream section have experienced more negative effects as an extensive area of 562.25 ha. has been submerged along with a wide part of forest cover and displaced 20000 number of people, though the people still inhabiting on the periphery of the dam receive some benefits of the dam also.

The downstream area of the dam enjoys most of the benefits of the dam but not totally free of the negative effects and resultant problems in the long run. Extensive field visits reveal that the physical components of the downstream area of the Kangsabati dam have experienced some beneficial changes, which are absent in the upstream area. The mouzas in the immediate downstream section selected for study, has experienced a number of adverse changes brought by the dam. Consequently the socio-economic conditions tied up with the rhythm of the physical elements of the basin, has also experienced a number of negative changes.

The discussion in the preceding chapters (Chs.1 to 9) has revealed that the people in the upstream and downstream sections of the Kangsabati dam have experienced positive and negative impacts of
different magnitude. The dam has affected directly the physical environmental components of the mouzas selected for study. The topography, vegetation, surface and sub-surface hydrology and soils of both the sections have been affected due to construction of the dam. The reservoir has engulfed the most fertile agricultural lands of the upstream area and the topography has been deformed to realize the reservoir. The forests existing in the selected upstream mouzas has been submerged and destroyed. The soil cover of the catchment portion of the reservoir has been eroded and regolith exposed. All of these have exerted negative impacts on the lives, livelihoods, culture and even spiritual existence of the local indigenous people living in that section. Due to structural inequalities, cultural dissonance, discrimination and economic and political marginalization, those indigenous tribal people have been suffered alarmingly from the negative impacts of the dam. The most important observation is the problem of rehabilitation of the people displaced from the upstream section. The people of the immediate downstream section has another problem of water scarcity, because the irrigation canals supply water to the command areas enough distant from the dam. Thus inequality in the distribution of water and other benefits of the dam has caused discrimination in the development of the area. The lion's share of the benefits of the dam is received by the people of the command area and loss by the people of the immediate upstream and downstream sections. This has resulted in the inequality in the development of the people of different locations within the study area. The gap in the scale of the development has created a series of economic
and social problems in the two sections. The whole discussion (Chs.1 to 8) may be summarized and concluded as follows:

1. The area under study is characterized as a connecting link between the Plains of Bengal in the east and the Chhotanagpur Plateau in the west. The area is located in the south-western part of the district Bankura and the southern part of the district Puruliya, West Bengal, along the left and the right bank of the river Kangsabati. It includes 36 selected mouzas, of which 18 mouzas are situated in the immediate upstream parts and the other 18 mouzas are situated in the immediate downstream parts of the Kangsabati dam (Ch.1, Map No.1.1). The selected mouzas in the upstream parts of the Kangsabati dam extend from 23° 02' 14" North to 23° 04' 22" North latitude and 86° 41' 22" east to 86° 47' 44" East longitudes. The selected mouzas in the downstream part of the Kangsabati dam extends from 22° 25' 11" North to 22° 57' 59" North latitude and 86° 45' 14" East to 86° 49' 48" East longitudes. After the construction of the dam a large part of the land of those 36 mouzas in the upstream and downstream sections faced sudden ecological change- the upstream areas are submerged in the peak period and at the same time experiences shortage of water during summer when the reservoir is dried up, whereas, extensive areas below the dam site, which availed sufficient water before the construction of the dam with a prosperous rural economy, now suffers from acute shortage of water both in the dry and wet period. Maximum of the affliction caused by construction of dam are suffered by the people of upstream parts as the reservoir has swallowed up extensive parts of the upstream areas forcing the resident people to be
displaced. Equally, the humid water-dependent ecosystem of the downstream part has experienced wider range of unpredicted impacts related to physical economic and social aspects. The apparent benefit availed by the people living in the command area gradually discovers in the long run a number of unexpected impacts like crop failure, unequal and untimely distribution of water creating social conflicts and unequal economic development creating economic and social inequalities. Loss of soil and increment of salinity in soil is gradually realized by the people of the command area.

2. The study reveals that the physical backgrounds of the Kangsabati dam and its surrounding have influenced directly the socio-economic environment (Ch. 2). The dam has built on the river Kangsabati which flows through the districts of Puruliya, Bankura and Medinipur with a length of about 368 km. The length of the river in the upstream area of the dam site is about 98 kms and below the dam is about 270 kms. Total catchment area of the river is about 9736 km² of which 3626 km² lie above the dam site and 6110 km² lie below the dam site. Maximum benefits of the dam are received by the districts of Bankura and Medinipur (Map No. 2.1).

3. The basement rock of the study area and its surroundings is composed of Precambrian and Achaean granites and gneissose rocks which are suitable for dam construction. The highest altitude of the selected area measures to 237 metres and the lowest, 100 metres. About 75% of the spot heights occur below 175 metres whereas about 5.6% of the spot heights on the plateau summit part
of the area occur 225 metres (Ch. 2). This observation reveals that most of the erosion surface of the area has a height below 175 metres and this part of the study area experienced active erosion and the eroded materials are ultimately deposited in the bed of the dam. Thus this part needs appropriate planning to check soil erosion.

Analysis of slope reveals that there is a clear difference in slope between the upstream and downstream section of the dam. The upstream section is characterized by primary erosion slopes (Ch. 2) carved by the rivers Kassai and Kumari and their tributaries. Therefore the land capability and cropping intensity are less than the downstream and the command areas. The whole study area is traversed by the river Kangsabati and its numerous tributaries. A large number of rivulets have intersected this undulating plain resulting into a number of parallel strips.

4. The study area receives a total annual average rainfall of 1400 mm, about 80% of which is concentrated between the months of June and September. January is the coldest month with mean daily maximum temperature of 25°C and a minimum of 12°C, the range of temperature being 15°C. The diurnal range of temperature is highest in the driest months and lowest in the rainy months. The study of climate for the upstream (Ch. 4) and downstream (Ch. 5) sections reveal that the climate of the area, despite the existence of the dam, lays down the very basis for agricultural land utilization. Because, firstly, the immediate downstream section does not receive
irrigation from the dam, and the dam itself is dependent on rain water harvesting. The amount of available rainfall is most important because there is low percentage of potential underground water resource beneath the rugged undulating hard rocks, particularly in the upstream sections of the study area. Besides the agro-economic significance, the morphological, pedological, vegetational and drainage conditions of the study area have been fashioned almost exclusively by the climatic elements.

5. The soils of the upstream sections of the study area are broadly divided into three main types: red soil, laterite soil and alluvial soil. Except alluvial, both red and laterite soils are slightly acidic in reaction, poor in calcium and organic matter, not suitable for paddy, unless good manuring is done and fertilizer is applied. The alluvials are generally found in limited parts of the lowland known as bahal.

The downstream section of the study area is covered with three broad categories of soil - Gneissic, Gondwana and transition soils which are collectively known as Residual soils and are formed due to weathering of bed rocks (Ch. 2). The first category occurs in the upper topography, the second in the lower topography and the third on undulating topography. Most of the gneissic soil has been subjected to laterization. Laterites are formed by sub-aerial weathering of almost all types of rocks through alternative spell of dry and wet monsoon climate. The detailed study on soils reveal that, this soil is slightly acidic to neutral in reaction, and cultivation of paddy is very difficult except in lowlands. Only inferior types of
cereals, pulses and oil seeds are grown on this soil which records poor yields. These soils are very much susceptible to erosion as it occupies mainly the highland portions. The Gondowana soils occupy more area than the Gneissic soils. Their rate of erosion is low and comparatively more fertile than the Gneissic soils, but texture is coarse and sandy. Transition soils are dark in colour, fine in texture and more fertile than other two groups of Residual soils. But this soil is not abundant throughout the area.

6. The natural vegetation of the area is essentially deciduous. Both the upstream and downstream section of the dam, the forests has been cleared mainly due to extension of agricultural activities (Ch. 2). The residual vegetation has been degraded to a greater extent and now replaced by shrubs, bushes meadows and agricultural fields. A wide tract of forest of the selected upstream mouzas have been submerged and destroyed for the dam. Forest in the downstream section also has been affected for the same cause. Destruction of the forest, as evident from the field study, has directed affected topography and soil through active soil erosion, which, on the other hand, has encouraged sheet, rill and gully erosion. Local people dependent upon forests are facing problems regarding their economy, habitat and even privacy. Vegetation holds soil and moisture, checks soil erosion, creates comfortable microclimate and provides material resources. Afforestations and reforestation in both the sections of the study area is an utmost need.
7. The study on population reveals that population in the study area has increased at a considerable rate (Ch. 2, Table 2.6). But the rate of increment is obviously higher in the command areas and low in the upstream parts (Ch. 4). This is a matter of great concern as it puts immense pressure on natural resources like land, water and forests. According to census 2001, the upstream area of the Kangsabati dam, with an area of 19.22 km², has a population of 6933 persons, of which 3598 are males and 3335 are females. But there is considerable variation in the distribution through the selected mouzas, and the density varies from 126 to 689 persons per km² (Ch. 4, Table No. 4.14), on the other hand, the downstream section, with an area of 22.22 km², has a population of 13138 persons, of whom 6715 are males and 6423 females. The density of population ranges from 113 to 1809 persons per km². The area is inhabited by three categories of people- General Castes, Scheduled Castes and Scheduled Tribes. The most striking feature of population in this area is the remarkable number of ST population. Their percentage in the upstream section of the study area is 12.96% and in the downstream section is 16.22%, whereas, the state average is only 5.5% (2001). These people possess less amount of fertile land and actually do not receive the benefit of the dam. Special programme for development and social justice to them is another necessity. Majority of them live Below Poverty Line (BPL).

8. The study on impact of the Kangsabati dam in the upstream and downstream section reveals that there are some direct impact upon the land, soil, vegetation and surface and sub-surface hydrology.
The reservoir has submerged totally 84 mouzas which measures for 13660 hectares of land (Ch. 6) of which 1229.40 hectares was high quality fertile sole lands which was very suitable for multi-cropping and 204.90 hectares of medium quality kanali lands suitable for mono-cropping. Submergence of these lands has greatly affected the socio-economic condition of the area. Out of the 18 selected mouzas of the upstream section, 16 has been inundated with the absence of vegetation as they have been destroyed the soil, which has now become degraded and susceptible to erosion. The quality of soil has been gradually deteriorated, thinned out and has become unsuitable for good yield. Dense forests of 6073 hectares have been submerged under the Kangsabati reservoir of which the 18 selected mouzas had a share of 48.58 hectare. Destruction and submergence of this forest have compelled the tribal poor to reduce the number of cattle population. The villagers in this area responded that they suffer for a considerable time of the year from cough and cold due to the presence of the humidity and are easily attacked by water borne diseases. It has been observed that the reservoir water has slowed down the inflow of the upstream river and silts are unloaded in the reservoir water. People of the three selected mouzas responded that the underground water table in the downstream section has a regular annual fluctuation. The poor people practicing cattle rearing are facing economic loss for purchasing fodder. As per field work, more than 20000 people were displaced for the construction of the dam but very few of them were given compensation and rehabilitation, ousting from
their old habitat. Likewise the downstream section has faced effects of the dam. But in context of irrigation, crop yield and extension of agricultural land and opportunity of employment, the immediate downstream mouzas gained very little, the benefits are actually received by the people in the command area. One of the most important feature is that, a very short distance road which existed before the commencement of the dam and connecting Manbazer with Ambikanagar, has been submerged and the new road constructed surrounding the Dam has actually increased the distance. The study reveals that the Kangsabati project has affected its catchment and command areas discriminatingly. Some of the effects positive to the command areas such as availability and use of water, good yield etc. are almost absent in the catchment areas. On the other, submergence of good quality land, forests etc. which are the negative impact in the catchment areas, are absent or less severe in the command areas. But there is a similarity regarding the non-availability of the benefits between the mouzas of immediate upstream and downstream section. The upstream mouzas are periodically submerged creating uncertainty in water availability. On the other; the immediate downstream mouzas rarely get irrigation water. So, these two parts of the study area are most negatively affected, for which public and private efforts with sustainable development plans and social security are necessary.

9. The very primary objective of building the Kangsabati 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.

10. The researcher has observed that boundary walls of the agricultural plots are sometimes broken; through which water and silts are released. Plantation on these boundary walls may be performed to preserve these precious resources. A number of problems related to the study area have observed by the researcher. The Kangsabati 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 stream 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. The average share of people living Below Poverty Line in the upstream area is 70% and for the downstream area it is 60%. But it is a matter of great concern that, about 80% of the STs and 70% of the SCs of the area live Below Poverty Line. Unemployment, illiteracy, crop failure, inequality in the distribution of irrigation water and flooding are some other problems concerning the study area. Through conscious field study, the researcher has also observed enough potentiality to overcome those problems. The discriminatory effects of the dam may be gradually minimized through implementation of some programmes related to rain water harvesting, micro-watershed management, land quality development and community forest management.

Summarizing all the discussion, it may be concluded that Kangsabati dam has exerted discriminatory effects in the upstream and the downstream sections of the study area. Being predominately an agricultural area, both the sections need some plan to bring a balanced development of the whole area. Active participation of the local people in the development programmes is needed.
Plate-1: Extension of agricultural land has invited deforestation around the Dam
Plate-2: Severe erosion on both sides of the emergency outlet causing loss of soil and vegetation
Plate-3: Potholes on hard granitic bedrock and colluvial fans in the course of outlet signify the force of released water
Plate 4: *Putus* (Lantena camera) as herbs appears seasonally when the reservoir dries up.
Plate-5: Herbs and grasses grow in the river beds signifying the absense of water flow
Plate-6: Selected parts of the reservoir bed used for growing crops in summer
Plate 7: Survival of crop-raising and cattle grazing combined old economy
Plate-8: The upstream side of the dam where water recedes back within short time
Plate-9: The bed of the reservoir during summer
Plate-10: Families who lost their land for construction of the reservoir still try to manage their livelihood from the dried up parts of the Dam.
Plate-11: A) The Dam wall and B) the sluice gate of the left bank feeder canal
Plate-12: Interaction with the oustees who believe that some day the dam will be abandoned and they will come back to their place of origin.
Plate-13: The residues of the old forest surrounding the Dam still used as ‘Jaher than’ (where the souls of ancestors rest in peace)
Plate-14: The old short-distance convient road submerged under the water of the reservoir


