

## Review

# Politics of water: The case of the Hirakud dam in Orissa, India

Balgovind Baboo

Faculty of Social Sciences, UNIMAS, 94300 Sarawak, Malaysia. E-mail: [balgovindb@yahoo.co.in](mailto:balgovindb@yahoo.co.in).

Accepted 30 November, 2009

Although three quarters of the globe is covered with water, there is a crisis for fresh water. In the next two decades many countries might fail to provide safe drinking water to their citizens if there is no cooperative and systematic effort. The best way out would be to store and utilize the runoff in the rainy season. Large dams have been found to be popular for this purpose. While these are useful for flood control, irrigation, navigation, power generation followed by ancillary secondary and tertiary benefits, these also cause untold human miseries. However, large dam construction would be an ongoing phenomenon across the world and more so in the era of globalization as many professionals and politicians tend to believe in mega projects supported by a powerful lobby. In this paper we examine the case of the Hirakud dam, the longest earthen dam in the world, built in Sambalpur district, Orissa, India in the light of a duality in human geography-determinism vs. possibilism-and a neo-Marxist stand point of centre-periphery approach. We find that river Mahanadi has been tamed temporarily in the name of developmental initiative in western Orissa but the political agenda was to save the eastern coastal plain and especially Cuttack city from the ravage of flood. The construction of the dam; the subsequent human sufferings, of the dam oustees and the affected population of about 22,000 households; and the recent concentration of important mile posts of Orissa in the coastal plains have accentuated the long standing cultural differences between the periphery and the centre, the hills and the plains, the silent and the vocal, the simple and the clever. Mindless mining and installation of so many extracting polluting industries and power plants in the districts of Sambalpur, Kalahandi and Sundergarh and the subsequent demand on the Hirakud reservoir and pollution of river Mahanadi led to simmering discontent in western Orissa. Resistance movement before the construction of the Hirakud dam was crushed by the political strategy of divide and rule and the overarching image of the Congress in the early years of Independence. Recent outcry in the form of Western Orissa Liberation Front and Kosala Rajya has resulted in Western Orissa Development Council to take up the problems of western Orissa. While some people in the command area have prospered, the oustees and the affected persons of the Hirakud dam still live under the stigma of reservoir oustees (*budi anchalar loka*); feel that the coastal people have been the cause of their sufferings and cherish the desire of going back to their homeland in the event of breach of the dam. Let us be careful of the sound of the distant drum!

**Key words:** Water, politics, displacement, underdevelopment, discrimination.

## INTRODUCTION

Water is one of the five elements which constitute Nature. Others are: earth (soil), space (sky), air, and fire. Human Geographers, especially the Determinists, believe that these elements of nature also determine the social nature of human beings. The Possibilists tend to believe that with the help of science and technology man can control nature and make use of or create these elements for its survival and sustenance. In our day-today-life we depend on these five elements of nature to various extents. In the early days of human civilization these resources (except

fire) were in abundance and there were very few users. As time passed by population increased and the enlightened population went for formal legislations, agricultural modernization, and industrial urbanization thereby increasing competition among people and Nations to possess and utilize these resources for consumption, comfort, and commoditization. In recent times this competition has taken ugly turn leading to intra-national and international disputes and wars (Joy et al., 2006). As regards water alone, in the last 50 years, there have been

37 violent conflicts between states involving water rights and access to water, according to the UN and international law has provided little help in the prevention or permanent resolution of these conflicts, although 200 other water-sharing treaties have been signed globally (Mauzy, 2008). In this paper we would take only one of the elements of nature, that is, water and peruse its use, misuse and abuse at different levels and especially in relation to the water of river Mahanadi in the state of Orissa, India.

## **WATER: ITS AVAILABILITY AND UTILITIES**

The total volume of hydrosphere, that is, the collective mass of water found on, under and over the surface of the earth is distributed in the oceans (97.2%); in glaciers, ice caps and ice sheets (1.8%), ground water (0.9%), fresh water in lakes, inland seas and rivers (0.02%) and atmospheric water vapor (0.001%). Ground water and fresh water are useful or potentially useful to humans as water resources. These imply that availability of water for human beings and the flora and fauna is limited. However, most of it is contained in sea and ocean and saline and cannot be put to human use unless treated properly. Desalination process is very expensive and third world countries would find it difficult. Water, available for human use, is a scarce commodity and we cannot survive without it. Hence human beings must judiciously utilize this sweet water. Besides consumption by humans and other living organism for health and sustenance water has several uses in and as irrigation, industry, pollution control, chemical solvent, fire extinguisher, recreation, etc. Water is considered a purifier of persons and places in most religions in terms of ritual washing/ablution, immersion, ritual bath of the living and the dead, etc. Sometimes people talk of the sacred or holy rivers like the Ganges and the Cauvery in India may be because of its multiple use and description in religious scriptures. Cities and civilizations have also been associated with rivers (e.g. Mesopotamia along Euphrates and Tigris), waterways (Singapore, Suez), and seas as strategic places in trade (London), fertile basins (Nile) and resorts (Lankawi). Water plays an important role in the world economy as it functions as a solvent for a variety of chemical substances and facilitates industrial cooling and transportation. Approximately 70% of freshwater is consumed for agriculture, 20% for industry and 10% for domestic use.

Due to increasing awareness about health and sanitation, growing population and requirements for industries there is increased demand for water. Water is both an economic good as well as a social good. Unscrupulous people have also been using water sources as dumping ground as a result of which there is increasing pollution. This may be the biggest simple misuse of water to the extent that a pollutant limits other uses of water; It be-

comes a waste of the resource, regardless of benefit to the polluter. Pollutants also affect the aquatic life. Clean, fresh drinking water is essential to human and other life. Access to safe drinking water has improved steadily and substantially over the last few decades in almost every part of the world keeping in line with the Millennium Development Goal. However, some observers have estimated that by 2025 more than half of the world population will be facing water based vulnerability that is water crisis. BBC news journalist Mike Embley investigated some of today's biggest water issues in the US/Mexico border, Namibia, Russia and Israel and has come to the conclusion that water is available in plenty but one in five people in the world are without access to safe drinking water primarily because of politics. Looking at the global scenario we suggest that the greed of human beings to immediately enjoy all sorts of comforts and find solutions to long term problems of nature result in water crisis. And in such a situation two principles: 'laws grind the poor and rich men rule the law' and 'everybody for himself and away from the gallows' seem to operate. Unbridled industrial-urbanization, imbalanced agricultural and poultry production to cater to consumerism, and a conspicuous life style devoid of sympathy to posterity result in cut throat competition to access a prized commodity, that is, fresh water. As a result power and politics determine the winner. History is replete with examples of such manipulation. While water seems to be a divine blessing on the mankind access of water, in the form of flood, is a curse. Nature does, more often than not, a balancing act. Flood creates havoc leading to huge loss of life and property, dismantling transport and communication network and sand casting vast agricultural tracts. It also means fertile siltation on the river banks and raising of water tables. However recurring floods dampen and stifle human potentiality for productive activities. Our present concern is on this duality of nature and the role of human intervention relating to it with power and politics.

## **INDIAN SCENARIO WITH RESPECT TO WATER**

The total geographical area of land in India is 328.762 m.ha. which is 2.45% of the global land area. The total arable land (as per Food and Agriculture Organization estimate) is 165.3 m.ha, which is about 50.2% of total geographical area against the corresponding global figure of 10.2%. India possesses 4% of the total average annual runoff in the rivers of the world; the per capita water availability of natural runoff is at least 1,100 cu.m per year (year 2000 estimates) and 12% of land area is flood prone.

The utilizable surface water potential of the country has been estimated to be 1869 cubic km. But the amount of water that can be actually put to beneficial use is much less due to severe limitations imposed by topography, inter-state issues and the present state of technology to

harness water resources economically. The recent estimates made by the Central Water Commission indicate that the water resources utilisable through surface structures are about 690 cubic km. only (about 36% of the total). Ground water is another important source of water. Quantum of water which can be extracted economically from the ground water aquifers every year is generally reckoned as ground water potential. The preliminary estimates made by the Central Ground Water Board indicate that the utilisable ground water is about 432 cubic km. Thus, total utilisable water resource is estimated to be 1122 cubic km.

Of the total 329 m.ha of land, it is estimated that only 266 m.ha possesses potential for production. Of this, 143 m.ha is agricultural land. It is estimated that 85 m.ha suffers from varying degrees of soil degradation. Of the remaining 123 m.ha, 40 m.ha are completely unproductive. The balance 83 m.ha is classified as forest lands, of which over half is denudated to various degrees.

Per capita availability of land is half of what it used to be some 35 years ago. The challenge of prevention of erosion (due to wind, water and overgrazing) and indeed of restoration of India's land resources is therefore intimately related to strategies for the management of land, water and vegetative cover. At present 141 m.ha are used for cultivation purposes. Between 1970 - 1971 and 1987 - 1988 the average net sown area has been 140.4 m.ha with a maximum of 143.21 m.ha in 1983 - 1984 and a minimum of 136.18 m.ha in 1987 - 1988. The need for production of food, fodder, fiber, fuel and urbanisation will put severe competing claims on the land. Moreover, water logging, salinity, alkalinity of soils on account of inadequate planning and inefficient management of water resource projects in conjunction with other adverse physical factors, will severely constrain the growth of net sown area in the future. Although India occupies only 2.4% of the world's land area, it supports over 15% of the world's population. Only China has a larger population. Almost 40% of Indians are younger than 15 years of age. About 70% of the people live in more than 550,000 villages, and the remainder in more than 200 towns and cities. The current annual increase of India's population is equal to the total population of Australia. The population density is 334 per square km and the fertility rate is 2.85. This vast population coupled with undulating terrain, increasing deforestation and global warming collectively put lot of pressure on water management.

In post-independent India there have been conflicts between states such as Karnataka-Tamil Nadu, Orissa-Madhya Pradesh, Haryana-Punjab, Gujarat-Madhya Pradesh for the use of river water and of reservoir of dam. Joy et al (2006) have documented 63 conflicts from different parts of India around thematic areas like contending water uses, equity, access and allocations; conflicts around water quality; sand mining; micro-level conflicts; dams and displacements; transboundary water conflicts and privatization.

## SITUATION IN ORISSA STATE

Within India Orissa state has a share of 11% of the available sweet water. The average annual rainfall is 1452 m.m. It is estimated that out of the total rainfall during June to September 80% are stored in dams, ponds, tanks and the like. Currently there are 7 large, 38 medium and 2340 small irrigation projects in Orissa and 4 large and 9 medium projects are under construction. It is also estimated that with the current demand water availability would run short by 34% in 2051. Although Orissa has some disputes regarding sharing of river and dam water with other neighboring states like Chhattisgarh (Kolab), Jharkhand (Subarnarekha), Andhrapradesh (Vamsadhara), within Orissa there have been conflict between districts on this issue. In the following section we would discuss the politics of sharing and preserving water from the longest river Mahanadi stored in Hirakud Dam.

Mahanadi, the longest river in Orissa is 880 km in length; starts from the Raipur district of Madhyapradesh (now Chhattishgarh) passes along Sambalpur, Athamallik, Baudh, Cuttack and falls into the Bay of Bengal of the Indian Ocean. The river was its boon and bane. Some of the important towns and cities of Orissa like Cuttack and Sambalpur are located on its bank and developed because of agricultural prosperity and commerce (Temple, 1864). Cuttack in Eastern Orissa was the commercial capital of Orissa and Sambalpur the most prominent place in Western Orissa. There have been occasional conflicts between the Governments of Orissa, Madhya Pradesh and Andhra Pradesh on the use of water from Mahanadi and other rivers as also for construction of dams on the upper reaches of Mahanadi. However, the most prominent conflict relating to Mahanadi hovers around the construction of the Hirakud Dam which has further polarized the cultural differences of the two broad zones of Orissa-the Western and the Eastern, the Sambalpurias and the Katkias, the hills and the plains, the silent and the vocal; the underdeveloped and the developed.

## THE HISTORICAL BACKDROP OF THE CONSTRUCTION OF THE HIRAKUD DAM ALONG RIVER MAHANADI AND IB

Economically Orissa is one of the most backward states in India. This is proved in terms of several indicators of economic development over the last many years. Besides the socio-political factors, natural factors also seem to be responsible for the backwardness. Terrible famines hit Orissa in the 14<sup>th</sup>, 15<sup>th</sup> and 16<sup>th</sup> centuries. In the famine of 1865-66, nearly a million of people perished in the district of Cuttack alone. Since 1868 there have been as many as 39 floods in the Mahanadi delta (extending over 2300 square miles constituting nearly 70% of the central delta), the most fertile and densely populated tract in Orissa (Govt. of India.1961:35). Floods have been al-

most an annual feature in the three important rivers-Mahanadi, Brahmani and Baitarani in Orissa. There were floods in Orissa in 1834 - 1835, 1845 - 1849, 1852 - 1856, 1911, 1919 and 1920, 1925 - 1927, 1929, 1933 and 1937. Common high floods occurred in the three important rivers in 1896, 1960 and 1961. These floods caused extensive damage to the standing crops. The damages in terms of loss of human life, cattle and livestock, houses, breaches, sand-cast area, standing crops, and break down in communication are enormous. It has not always been evaluated but on average it amounts to about 12 lakhs rupees (Government of India, 1947:49). In 1858, Sir Arthur Cotton of the Commandment Madras Engineers said, "In the last 23 years there have been three years of famine, four years of drought, two years of severe inundation, seven years of inundation and seven years of moderate seasons in coastal districts" (Government of Orissa, 1958:36).

Such floods and droughts necessarily cause insecurity to life and property; have a demoralizing effect on the inhabitants and shatter their enthusiasm to improve land, home and village (Agrawal, 1967: 40 - 42). During 1911 - 1937, there were nine years of flood with a loss of rupees 20 lakhs to 66 lakhs on each occasion. The huge loss due to flood topples the gain due to silting of river banks and fields, clearing of the mouth of the river from sand and flushing of salt pans created due to perennial irrigation, etc.

There were several Flood Enquiry Committees appointed by the Government of Orissa in 1928, 1938 and 1939 - 1942 to suggest measures to tackle the recommendations for local relief. Floods continued and every time the drama was enacted-aerial survey, supply of food, cloth and medicine, dispatching boats and army personnel for rescue operations, etc. by the state and the Centre. Since all the influential officers and politicians came from the coastal districts and wanted to get rid of the menace of flood of Mahanadi in any case, they suggested the construction of a dam in the upper reaches of Sambalpur district. It was decided on 8-11-1948 to go ahead with the construction of the dam although the foundation stone was laid in March 1946 and the actual construction work started in middle of 1948 before the final techno-economic details were available. This means that the construction of the reservoir and the dam was a foregone conclusion and was not in consultation with the people who would be affected by the submergence of their area.

### **THE RATIONALE FOR THE SELECTION OF THE SPOT**

The present dam site was selected after a lot of deliberations. The advantages of the site were: it contains 67% of the drainage area responsible for the floods in the delta; the submerged area of the reservoir was exclusively in Orissa; the availability of unlimited quantities of limestone

and coal within a radius of 30 miles for the manufacture of cement, an important component; the nearness of Sambalpur railway station and district headquarters, availability of service roads; presence of mineral deposits like iron, manganese, bauxite and limestone in the vicinity for future establishment of ferroalloys, aluminum, cement and other factories; the soundness of the foundation rock and absence of complex geological features; availability of aggregates, sand, suitable earth and granite stones within the river. The small width of the river Mahanadi at this point and the presence of two hills on either side-Lum Dungri in the left and Chandli Dungri on the right-leading to lower cost, was also very important consideration. Further the 43 affected villages on the right side were hill and forest clad and the rest of the villages on the left side, though fertile, were poorly developed in terms of minerals and roads, and contained no railways, bridges, major structures and hence the loss was assessed to be minimal due to submergence (Agrawal, 1967: 21, 27, 31, 40 - 42).

### **PEOPLE'S RESISTANCE**

When people of Sambalpur district heard about it way back in 1945 there was substantial mass agitation. Anti-Hirakud dam campaign was launched since it was expected to submerge 108 full and 141 part revenue villages of Sambalpur district and also 3 full and 33 part villages of Pugar and Saraipali station of Madhya Pradesh respectively. Also the most fertile tract of the Sambalpur district was to submerge. People protested as they thought that the terrain of Sambalpur district would not be suitable for laying out canals, there would be huge loss of cultivable land, uprooting and dislocation of people, destruction of community life and general dispossessions (Nanda et al., 1987). They thought that it would be a positive gain for the coastal districts and deprive the inland/ highland district such as Sambalpur. The main issue was why should people of Sambalpur district sacrifice so much for Cuttack district that are considered the long-term exploiters and clever people. If necessary the latter can be rehabilitated away from the flood plains. There were several demonstrations; the largest being attended by 30,000 people and the ultimate demand was the separation of Sambalpur district from the rest of Orissa. At a time when the country was struggling for Independence and there were many divisive tendencies, such protest was resisted strongly by the Congress party and it was also disapproved by Gandhiji. It was also considered an anti-developmental activity led by the feudal rulers who were likely to lose most of their land. The movement fizzled out because of the imposing image of the Congress at that time, the arrest of important leaders leading to closure of communication channel, the casual participation of the people especially of the submergible area, the sheer disbelief of people that the rivers like Mahanadi and Ib can ever be dammed, the

withdrawal of local congress leaders, the betrayal of some leaders and the projection of the dam not merely as an anti-flood measure but as a major developmental project in Orissa in general and Sambalpur district in particular. All the positive aspects of dam construction—flood control, irrigation, power generation and subsequent industrialization, infrastructure development, navigation, and availability of water for domestic and industrial use—were highlighted without telling people the long term negative repercussions (Goldsmith, 1984).

### THE PROMISES

The policy recommended in the project report was that “the government should give as compensation, as far as possible, land in exchange of land and house in exchange of house and that too well ahead of the date of actual submergence. The compensation in kind or cash should be on terms which are equitable and if anything generous. The government should assist the people in rehabilitation and strive to create conditions in the colonies which should be a definite improvement on the existing ones” (Government of India, 1953). Model villages with the essential amenities of life, that is, drinking water, sanitation, schools, community centres, electricity, etc. were suggested.

### THE BENEFITS AND COSTS

Availability of raw materials nearby, cheap labour, lack of long-term resistance from people and the strong zeal during initial post-independent years enabled the construction of the dam in 8 years time and with a total expense of about 100 crore rupees. It has a dyke of 13 miles, the main dam is about 3 miles and the maximum height is 195 feet. This is the longest earthen dam in the world and the reservoir is the largest artificial lake in Asia. The construction of the dam has affected 249 villages, 22144 families, 18432 houses and 112,038.59 acres of cultivated land which were submerged in the Hirakud reservoir. In all the Hirakud canal system irrigated 611 villages (partly or wholly) in Sambalpur and Bolangir districts and the gross command area is 3, 20,000 acres and 2,20,000 acres in Sambalpur and Bolangir districts respectively (Sovani et al., 1960). However, the Public Accounts Committee was not satisfied with the financial handling of the project. From technical point of view there have been questions regarding cracks in the dam due to improper curing of concrete at the time of construction and high rate of silting affecting irrigation and generation of electricity. Further, the unabated release of effluents from the Orient Paper Mill at Brajaraj Nagar and the industrial, domestic and municipal sewerage onto the river and the reservoirs has resulted in water borne diseases and increased alkalinity of water. The reduction in the storage capacity of the reservoir during 1956 - 1988 and later has been a matter of grave concern for

the planners and the people who have been now heavily dependant on the dam. On top of it the increase in the frequency of flood from 11.8 years in 1956 to 3.75 years in 1988 has belied all hopes of flood control (CSE, 1982). My personal observation is that there seems to have been general prosperity in the command area of the Hirakud dam in terms of increased mono-cropping and productivity of paddy, development of infrastructure and housing and social mobility; although not all of it as a direct result of irrigation. It has also led to increasing indebtedness of most sections of the society because of a false sense of modernization and conspicuous consumption. It has led to depletion of natural resources—forest and grazing land; shortage of space for burial ground and defecating and dumping of garbage. It has also led to the critical importance of time in agricultural activities and hence stiff competition among agrarian classes. Because of increasing mechanization the mutual exchange on land, labour and livestock has declined substantially leading to visible difference in rural population. On top of it the political gimmick of electoral politics, development and the division of the spoils has definitely fragmented the agrarian populace.

### THE SOCIAL COSTS

Before the implementation of any major developmental project there is usually a feasibility study; sometimes called the benefit-cost analysis which takes into cognizance the techno-economic survey and the socio-economic survey. Benchmark studies are available for Hirakud Dam which is unanimous in terms of its potential as a mega project. The basic assumption behind the construction of this dam is to control flood in Cuttack district of the Orissan delta and to irrigate the Sambalpur-Bolangir tract. I undertook intensive fieldwork in ten localities of Sambalpur district to understand the process of reconstruction of past social space by the oustees and affected population from the Hirakud dam. Out of these ten localities there were six villages of different spatio-cultural categories (Tribal, Peasant, and Suburban), two foreshore villages, one heterogeneous colony and one homogeneous colony. I understood the process of their evacuation, compensation, rehabilitation and resettlement about thirty years after the construction of the dam. The findings have been documented in my book “Technology and Social Transformation: The Case of the Hirakud Multipurpose Dam in Orissa” (Baboo 1992).

As regards the present inquiry about politics of water, It was submitted that the oustees and the affected people unanimously felt victimized, discriminated, dispossessed and marginalized (Cernea, 1985). They were not at all happy with the compensation paid for land (which ranged from Rs.50 to Rs.500 per acre in 1957), house and other assets. Even now some 4000 families have not received their compensation and it would be difficult to do so now as most of the records got destroyed. They felt complete-

ly alien in the new locality and suffered from the stigma of 'reservoir oustees'. Their overall life span was low as they suffered from mental trauma and hard physical work so essential to survive in the new places. Women suffered more than men and kids suffered from stolen childhood without proper schooling and merry-making. People those who were used to plenty of water near the river banks were dumped on forest-cleared upland and they kept on remembering their bygone days. In summer, when the water of the Hirakud reservoir recedes, the oustees go to or near their old village for picnic just to revive the past. They were thoroughly dissatisfied with the developmental initiative of the government of Orissa and felt that people from Cuttack district were responsible for their present sufferings. If Hirakud dam breaches; they would like to go back to their original village. They have strong anti-coastal and anti-Katakia feeling and consider the coastal people as colonizers. They strongly believe that Hirakud Dam was constructed primarily for protecting Cuttack city from the ravage of flood of Mahanadi rather than the developmental initiatives in Western Orissa. On the other hand people of the command area of the dam in Sambalpur, Bargarh, and Subarnapur (formerly undivided Bolangir district) districts complain of non-availability of water for irrigation, poor repair and maintenance of the canal system, the decision of the government to supply water for industrial use and general apathy of the officers to look into crop loss, enhanced revenue and water tax and erratic recording of cultivated and irrigated area. Gradually the storage capacity of the dam is decreasing due to siltation as a result the target of irrigation and power generation is not being met. Mindless mining and industrialization in the vicinity of the reservoir and releasing of effluents to the river system further complicate the issue.

There is always simmering discontent which has of late manifested in Western Orissa Liberation Front (WOLF), Kosala Rajya and the government-recognized Western Orissa Development Council. Series of protests and demonstrations in Sambalpur and Bhubaneswar have been staged; issues are raised during elections but forgotten after that. The feeling of deprivation is more evident these days when all the natural resources of North- West Orissa are being exploited quickly and the extracting and polluting industries are being located there. On the other hand transport network, important offices, High court, universities, institutes of higher learning, airport, Rajdhani and superfast trains are all concentrated in the East especially around Bhubaneswar-Cuttack. Recent works on regional disparity corroborate this position (Meher, 1999).

## CONCLUSION

Water is an urgent necessity for the survival of the biosphere. Excessive water is equally harmful. River dam construction is a major mechanism for flood control which

also has various other utilities. However, large dam construction has several disadvantages as well. Study of the Hirakud Dam in Orissa informs us that (a) controlling Nature has its own hazards and (b) power and politics play important role in developmental initiatives which justifies the old saying 'one man's food is another man's poison'. At a higher level of abstraction the centre-periphery theory seems to be more befitting to this situation.

## REFERENCES

- Agrawal GD (1967). *The Story of the Hirakud Project*. Delhi: Ministry of Irrigation and Power, Government of India.
- Baboo B (1992). *Technology and Social Transformation: The case of the Hirakud Multipurpose Dam in Orissa*. Delhi: Concept.
- Centre for Science and Environment (1982). *The State of India's Environment: The First Citizen's Report*. Delhi.
- Cernea M (1985). *Sociological Knowledge for Development Projects in M. M. Cernea ed. Putting People First: Sociological Variables in Rural Development*. New York: OUP.
- Goldsmith E, Hildyard N (1984). *The Social and Environmental Effects of Large Dams. Overview*. Camelsford: Wadebridge Ecological Centre. 1
- Government of India (1947). *Hirakud Dam Project, Mahanadi Valley Development*. Simla: Government Press.
- Government of India (1953). *Public Accounts Committee, 1952-53. Sixth Report. Hirakud Dam Project*.
- Government of India (1961). *Ministry of Information and Broadcasting. Our River Valley Projects*. Delhi.
- Government of Orissa (1958). *Floods in Orissa Rivers during 1955-56. Final Report, Bhubaneswar: Revenue (Spl.) Relief Department*
- Joy KJ (2006). "A million Revolts in the making: Understanding Water Conflicts", *Econ. Pol. Wkly*. 16(7): 18-24. Feb.
- Mauzy DK (2008). *Water Wars: Singapore versus Malaysia*. Post-Doctoral Project, Dept. of Political Science, UBC, Canada.
- Meher R (1999). *Development Disparities in a Backward Region- A District Level Analysis*. New Delhi: APH Publishing Corporation.
- Nanda S, Tripathy PK (1987). "The Hirakud Rehabilitation and the Displaced People", *Seminar on Development and Displacement, Centre for Study of Culture and Society, Burla, 20-21 December*.
- Sovani NV, Rath N (1960). *Economics of a Multipurpose River Dam: Report of an Inquiry into the Economic benefits of the Hirakud Dam*. Pune: Gokhale Institute of Politics and Economics.
- Temple R (1864). *Report on the Mahanuddy and its Tributaries*. Calcutta: John G. Hirons.