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Review

Institutionalizing environmental hazards for 'public needs': Destruction of forest for drinking water supply in Kerala, India

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Natural resource exploitation is increasingly being considered as a technical issue with the assumption that it can be compensated for. The public concern shifts towards such destruction only when it affects the normal course of day to day life. Immediate needs often undermine the process of institutionalizing knowledge to ensure conservation of natural resources. The question of immediate needs often acts as the determining factor in decision making. This paper is focused on such an environmentally-legal issue in ensuring water availability through the destruction of rain forest. This paper discusses this issue in detail and raises the question of failure of institutionalizing knowledge.

Key words: Sustainability, institutionalizing disasters, beneficiary group, neo-liberalism.

INTRODUCTION

This paper is about the socio-environmental relationship in contemporary ecology management. Diversion of rain forest for drinking water supply scheme is discussed as a contradiction in environmental governance.

Pipe water supply services are largely depending on perennial sources of water, especially surface flowing water. Fresh water eco-systems are integral parts of surface water and flowing water. The dependencies on perennial sources are also rising. Thus, drinking water supply providers are forced to pay less attention on ecology and put more efforts on ensuring water supply. Water polices are become incapable to protect the aquatic biodiversity and other vital resources. The ecological impact of freshwater ecosystems is undervalued across the world. This crises put in place certain recommendations, such as equitable market, realistic pricing and protection of ecosystems (Johnson et al., 2001).

The cost of supplying water supply is generally calculated on the basis of neo-classical economics, which gives thrust on 'full cost pricing' based on the 'user pays' principle. This cost criterion failed to assess the environmental cost. Environmental and social costs are having multiple dimensions and implications are also different (Abeysuriya K et al 2008). Environmental costs are directly connected with the deterioration of natural assets due to economic activities (United Nations, 1997).

The natural resources such as streams, rivers, lakes,

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Abbreviations: BG, Beneficiary Group; **WB,** World Bank; **KWA,** Kerala Water Authority; **O&M,** operation and maintenance; **KRWSA,** Kerala Rural Water Supply and Sanitation Agency; **SEUF,** Socio Economic and Unity Foundation; **JBIC,** Japan Bank of International Cooperation.

enhances its service to society (Forestry Commission: getting widened across the world. Climate change, population and unregulated consumption of freshwater will lead to freshwater crisis in the coming century. Sustainable utilisation of freshwater is depends on the changing culture of water management (Robert B et al 2002). Environmental conservation programmes faces multiple challenged in the developing world due to the dependency on resources (Brooks and Roumasset 2002).

The market process of pure demand management do not just between objects (commodities or inputs) and objective functions (demand, supply, utility, profit), but rather reflect relations between living human beings (Zafirovski, 2000). Such relation is often challenging the institutions formed to meet the demand and supply. However, The sustainability of institutions is getting public support. Institutional understanding of ecology has been de-limited into the sustainability of collective needs rather than ecological equity. This paper discusses this issue with reference to forest vis a via drinking water provision in Kerala, India.

The paper examines the role of the State in institutionalizing ecological damage in the neo-liberal development governance. This paper attempts to examine the institutional nature of ecological destruction and its consequences on governing environment. The neoclassical economic understanding of ecology and natural resource conservation do not reflect the social, economic and environmental realities of the world. The strongly integrated utilitarian approach to development critically destroy the value system based on ecology and alternatives to protect (Anthony M 1992).

The paper focuses on the bureaucratic understanding of ecology and the problems of identifying alternatives. This paper is the result of an enquiry on a foreign funded drinking water supply project in Kerala, India. The project is called Japan Bank of International Cooperation (JBIC) Funded Urban Drinking water supply augmentation programme.

One component of the project is to increase the amount of pipe water supply to the urban consumers of Kerala Water Authority (KWA) in Thiruvanthapuram District of Kerala, India. However, after completing all the infrastructure development, KWA had faced an unparalleled legal hurdle to carry over the project. The hurdle was the availability of water in reservoir situated in one of the rain forests to meet the demand. Increasing the dam's height at the cost of rain forest was the only solution left to augment the water supply. Since the reservoir is in the Wild Life sanctuary across the Karamana River, Government of Kerala had to take the prior consent of the Ministry of Environment and Forest,

Government of India to increase the dam's height. This issue has not met with any public criticisms and resistance. This is the motivation of this paper, and the paper tries to raise the following issues.

2011). The gap between demand and supply for water

a) How does the project influence the environmental governance of the State?
b) How are the larger alternative ideas discussed in these types of projects?

Secondary sources from Kerala Water Authority, discussions with the forest department staffs, Kerala Water Authority staff and members of Kani Tribal community have been used.

SOURCES OF WATER AND CHALLENGES

Kerala is well known for its water resources and the state is experiencing severe water scarcity. Protections of river resources are highly problematic. The annual rainfall availability is estimated to be about 3000 mm (Induchoodan, 1996). However, there is significant variation and a shortage of safe drinking water in many places of the state, besides the availability of average rainfall of 3,055 mm (Indian Meteorological Divisions).

Ground water availability in Kerala

Kerala has an annual replenishable ground water resource of 7,900 million cubic meters (MCM). The Central Ground Water Resource Board, Kerala Division has estimated that the net ground water availability of the State is 6229.04 MCM. According to Central Ground Water Board, only 48 per cent of the ground water sources in Kerala has been exploited (State Planning Board, 2003). Open wells are major as well as the traditional source of drinking water in Kerala; in fact the whole concept of drinking water is still attached to open wells. Centre For Water Resources Development And Management in 1989 revealed that there were three million wells in the state, of which 20 lakhs were private wells. The density of open wells is also very high in Kerala, with density around 250 well per sq.km in the coastal belt; 150 in the midlands and 25 in the highlands. Table 1 explains this in detail.

Surface water availability in Kerala

Kerala has 44 rivers, out of which 41 are west flowing and 3 east flowing. These rivers are characterized as ephemeral; so monsoon rainfall is the main source of survival (James, 2003) (Table 2).

The annual utilizable yield from 31 rivers is 49,199 MCM (63% of the total), with the state's share of 87 per cent (42,672). But it has been estimated that the state is utilizing only 25 percent of the annual utilizable yield (State Planning Board, 2003).

Though Kerala has huge water sources potential, the natural water conservation receives less public attention

Table 1. Ground Water Resource of Kerala as on March 2003 km^2/Year.

Provision for domestic and industrial and other uses	1.31
Available ground water resources for irrigation	6.59
Net draft	1.46
Balance ground water Resources for future use	5.13
Level of ground water development (%)	22.17

Source: Central Ground Water Board (2005).

Table 2. Medium river basins of Kerala.

River basins	Length (km)	Catchment area (sq. km)
Chaliar or Baypore	169	2788
Periyar Sivajini Hills	244	5398
Pamba Devarmalai	176	290

Source: Central Water Commission (1999) and Ministry of Water Resources (2004).

Table 3. Destruction of Forest Areas for Developmental Projects in Kerala (1980-2003)

State	Approved cases during 1980-2003	
	Number of cases	Area diverted (in hectare)
Kerala	182	40729.082
India	10358	872791.991

Source: Department of Forests & Wildlife, Government of Kerala.

Table 4. Types of forests in Kerala (Lakh ha.).

Forest type	Area	Total area (%)
Tropical wet evergreen forests	3.48	37.02
Tropical moist deciduous forests	4.1	43.62
Tropical dry deciduous forests	0.094	1
Mountain sub tropical	0.188	2
Plantations	1.538	16.36
Total	9.4	100

Source: Department of Forests & Wildlife, Government of Kerala.

and forest protection as well. Tables 3 and 4 explain the nature of the forest as well as its destruction. In Kerala, big cash crop plantation sector like rubber is considered as forest area.

Thus, the forest management policy of the state is heavily hinged on the interest of plantation lobby. Forest degradation is becoming an order of the day in the state; for instance from 1905 to 1965 forest degradation had been about 0.27% of total geographical area per year; in 1965 to 1973, 1%, from 1972 to 1975, 8611 sq. km, and from 1980 to 1982 is estimated as 7370 sq.km. 3.17% per annum (national average during the period = 2.79%).

PEPPARA WILDLIFE SANCTUARY

Peppara Forest area is one of the 18 'Biological hot spots' of the world. Peppara Sanctuary has great floral and faunal significance; now the number of hot spots is raised to 34. The sanctuary spreads over 53 sq.km of forest which forms the catchment of Peppara Reservoir. It was declared as a sanctuary in 1983. There are more than 4500 species of flowering plants found in Kerala. The sanctuary consists of part of Palode Reserve (24 sq.kms) and part of Kottoor Reserve (29sq.kms). The total area of the sanctuary is 53 sq.km. The total water spread of the reservoir is 5.82 sq.km. The sanctuary is located at about 50kms north east of Thiruvananthapuram city in Nedumangad taluk (Kerala State, India); it is between longitude 76°40' and 77°17' east and latitude 80°7'and 8°53' north. The records of Kerala Forest Research Institute indicate that there are 145 species of mammals of which 14 species are endemic to Western Ghats; 169 species of fresh water species; 93 amphibian species of which 40 species are endemic and 486 species of birds, with 16 endemic to Western Ghats, in addition to innumerable micro-flora and fauna.

General topography of the area is hilly with elevation varying from 100 to 1717 m. Rainfall and other climate factors are similar to that of Neyyar Wildlife Sanctuary. There are 13 tribal settlements in the sanctuary. Eleven are in Athirumala section and two are in Thodayar section. Peppara wild life sanctuary is a part of Agasthyamala forest. It is in Thiruvananthapuram District of the Kerala State, India. The forest types in the area are west coast tropical evergreen, west coast semi-evergreen, southern hill-top tropical evergreen, southern wet temperature, Southern moist mixed deciduous and southern montane grasslands. The biological wealth of these forests is not fully explored. The presence of medicinal herbs is a positive aspect. One of the 7 Medicinal Plants Conservation areas in Kerala Forests is in the sanctuary.

The water supply to Thiruvananthapuram City and adjoining sub-urban areas depended exclusively on the perennial streams sprouting from the rain forest of this sanctuary. See Table 6 for details of the dam.

PROBLEMS AND CHALLENGES

The major source of pipe water in the area is the Karamana River. The total production and demand and

Table 5. Demand and supply of drinking water in Thiruvananathapuram.

Year	2006	2011	2021	2036
Demand ML	246	261	294	331
Supply ML	151	151	151	151
Deficiency	95	110	143	180

Source: Demand and supply assessment report of Thiruvananathapuram. Kerala Water Authority 2005.

\ supply gap of drinking water supply in the city are as follows:

Total production – from major schemes - 190 ML
Miner schemes - 28 ML
Total - 218 ML
Loss due to leakages - 67 ML
Supply - 151 ML
Existing demand - 246 ML
Demand supply gap - 95 ML

Apart from that, Table 5 tells us the demand- supply forecast of the city.

The aforesaid Figure 1 show the increasing demand for augmented drinking water supply in the Thiruvananthapuram urban and semi-urban areas. Hence increasing the dam's storage capacity was vital for ensuring adequate supply of drinking water to Thiruvananthapuram in the coming years.

IMPLICATIONS OF AUGMENTATION OF WATER SUPPLY ON FOREST

Attaining the target is not just technical in nature; in order to reach this target, the storage capacity of the Peppara Dam would augment, which was the sole source of drinking water for Thiruvananthapuram. The Full Reservoir Level (FSL) at Peppara would go up from104.5 to 110.5 meters. The total water that can be stored in the dam would then go up from 40 million metric cubes to 70 million metric cubes. However, the issue arising here is that the augmentation of the dam's capacity would result in submerge of 267 hectares of forest land, for which Kerala Water Authority has estimated that compensatory forestation would compensate the rain forest of Peppara and it would require $6 Million. (This is from the reply for my request under Right to Information Act from Kerala Water Authority).

Table 6. Details of the dam.

Details of the dam	
Length of dam	438 m
Height of dam	36.5 m
Top width	4.0 m
Gross 70.70 Mm3	
Dead storage 1.6 Mm3	
Live storage 68.5 Mm3	
Hydrology	
Catchment area	60 Sq km
Average Rain Fall	481.00 cm
Annual Run off at Dam site	312.30 Million m^3
Peak Design Flood	860 m^3/second
Reservoir	
Full reservoir level	+ 110.50 m
Minimum Draw Down Level	+ 85.25 m
Gross Storage	70.00 Million m^3
Dead Storage	1.60 Million m^3
Live Storage at F R L	68.40 Million m^3
Water Spread Area at F R L	849.60 Hectares
Dam	
Type	Concrete straight gravity
General Bed level of river at dam site Length of Dam Top	+ 75.50 m 423 m
Height of Dam Above River Bed	36.50 m
Top Width	4.00 m
Length of Spill way Elevation of crest of spill way	49.00 m + 104.50 m
Spill way crest gate	4 nos 10 m x 6 m size
Outlet	1 No of size 1.50 dia
Quantity of Concrete	1,80,000 m^3

Source: Peppara Dam site

Legal issue

In 1972, the Government of India had declared The Wildlife (Protection) Act, according to which "every specified plant or part or derivative thereof shall be the property of the State Government if there is any offence committed against this Act or any rule or order made there-of, and, where such plant or part or derivative thereof has been collected or acquired from a sanctuary or national park declared by the Central Government,

Figure 1. Area of Peppara Dam. Source: Broacher of Peppara Wild Life Sanctuary.

such plant or part or derivative thereof shall be the property of the Central Government". In 2002 the Government of India had introduced The Wildlife Protection Amendment Bill, which did not make any substantial changes in the previous bill but extended the purview of the wildlife protection.

New legal task

The Government of Kerala is entrusted to seek the Central Government's help to amend the 1972 and 2002 Act to augment the dam's capacity. The State Government had made all efforts to get the act amended. Delay in getting permission would create a further economic crisis owing to the huge aid from JBIC. The project is a package of five water supply schemes approved for loan assistance by the Overseas Economic Cooperation Fund (OECF) of Japan (now the Japan Bank for International Cooperation) in 1996. The objectives of the project are to supplement and rehabilitate water supply systems of two urban regions namely Thiruvanathapuram and Kozhikode and to construct water supply systems for three rural regions namely, Meenad, Cherthala and Pattuvam including their adjoining villages. It is the largest ever urban Water Supply Project in the state. The total cost of the project is $ 389 million; Government of Kerala contributes $ 58.5 million and loan component is $ 331.45 million[1]. The Ministry of Environment and Forest has permitted the Kerala Water Authority to increase the dam's height in order to augment the water supply.

DISPLACEMENT OF TRIBAL

About 100 Kani Tribal families were displaced in 1981 as part of Peppara Dam construction and they were offered 5 acres of land as compensation. There has been no attempt by the Government of Kerala and KWA to distribute the land. The community settled themselves near the area close to the dam. There are about 13 Kani settlements in the reservoir area, of which 7 are within the close vicinity of the reservoir and facing the second phase of displacement. The displacement and livelihood laws of the Kani community have not been critically looked into while taking decisions on augmenting the drinking water supply.

The study raises the following issue for further discussion. The question is how do we define the 'water need' vis a vis forest/ecology? If we pose this question to the society, the likely answer would be in favour of water and not the forest. Thus an ecology hardly becomes an issue. Providers of water supply (Government) and beneficiaries (consumers) are equally responsible for this. Thus the following are the likely implications of the issue:

1. The possibility of institutionalising ecological hazards: The forest submerges have been introduced to the public not as an institutional failure but as part of a government's programme. This new perspective eventually institutionalizes the ecological hazards.
2. Lack of public protest: The urban consumers are not raising voice in favour of forest and the Kani community's displacement has not been considered as a social issue.
3. Challenges in the long term ecological sustainability: The crucial impact of these types of institutionalizations is that it would undermine the need of long term ecological management in particular.
4. Compensatory afforestation: The money offered by KWA to forest department for compensatory forestation needs to be critically looked at. Replacing the rain forest in Peppara is in fact an ambiguous statement, and indeed there are hardly any models available to justify this argument[2].

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[1] Loan Agreement between Government of India and JBIC for Kerala

[2] The chief forest officer said that KWA would give Rs 30 Crore for compensation and forest department would spend the money through social forestry department.

5. Lack of search for alternatives: Search for alternatives is completely set aside in the project. KWA and JBIC units are paying little interest in alternatives such as rainwater harvesting, leakage detection of KWA supply lines. Of course this may not be sufficient enough to meet the growing demand for water; however, these alternatives are able to meet the partial demand for household water requirements. Nevertheless, the larger impact of this type of project is that it would never allow such alternative to get institutionalised. Such institutions get less importance in environmental governance (Goldsmith: 1992).

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