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# IMPACT OF DEVELOPMENTAL PROJECTS ON ENVIRONMENT:A CASE STUDY IN UPLANDS AND COASTAL BELTS OF KARNATAKA

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## ABSTRACT

*Impact of developmental projects on environment has been narrated with the help of case studies. Two power projects and a river diversion project rooted in-and-around the Western Ghats have been taken into consideration. Power plant projects exert multi-facet impact on the ecology. In case of thermal power project it directly influence the environment through effluents, whereas small hydro power project may stimulate the scarcity of environmental flow to the downstream uses in addition to the existing inundation problem. The environmental flow allocation is still the bottle neck for one of the hot concerns of Dakshina Kannada district being the Yettinahole project. Care must be taken to implement economically viable developmental projects with high dependability which may run for a longer been.*

**KEYWORDS:** *Thermal power plant, Yield, Environmental flow.*

## I. INTRODUCTION

Growth of a country, expressed by means of an index-Gross Domestic Product (GDP), is directly dependent on developmental activities of that country. This is in turn directly reliant on the environmental clearances for various infrastructural related projects without which these developmental activities cannot be executed. There are direct dependency of the energy consumption and hence, the sources towards GDP [7]. In India earlier, the importance was given on service sector but later, it was diverted on infrastructural developments [8].

With reference to some live projects in and around the lowlands near the coastal belt and the Western Ghats, of Karnataka, understanding the environmental effects are very prominent. There have been some power projects listed under special economic zone (Thermal PowerStation, Hydro-Power Plant etc.) have shown rapid effects on the environment, whereas other related to the water

resources has expected to disturb the environment through the interferences within their hydrological cycle. This communication tries to address the impact of some developmental projects by reviewing the existing detailed reports.

Objective of this communication is to highlight the impact of developmental projects on the sensitive environment, which are biologically, socio-economically of immense importance. Further sections of this paper deal with the comparative case studies of three projects and a brief discussion on them. At the end, some important critical impacts of these developmental projects have been highlighted.

## II. CASE STUDIES

Three different cases of developmental projects have been considered. Two power projects and a water supply-river diversion projects in-and-around the eco-sensitive areas are studied.

### *A. The Thermal Power Plant at Udupi*

The costal belt of Karnataka is highly sensitive where most of west flowing rivers form estuaries and wetlands. The rivers, mostly originate in lowlands of Western Ghats. Coastal districts are connected through the national highway - 66 and Konkan railways. Agriculture related trade activities constitute a major lifeline of the resident of the people. A coal based Thermal Power Plant (TPP) of capacity 1000 MW was proposed in Nandikur village (Udupi taluk, Udupi district, Karnataka) in 1996 by Nagarjuna Power Corporation Limited (NPCL). This was followed by another proposal for 1200 MW TPP in 2003 in the same region. The plant started its functioning from 2010 causing enormous impacts in the villages nearby. The effected regions include Yellur along with surrounding villages of Padebetu, Nadsal, Nandikur, Santhoor, Karnire, Bada and Palimar. The study area falls within the hydrologic unit of Shambhavi River. Unscientific management of the effluents have led to the huge impressions on the local environment.

Major impacts of TPP is in the form of its effluents-which may be liquids or gases. As in the cases of power projects, including aforesaid and elsewhere in India, water is the major input and for which most of the project reports suggests the saline sea

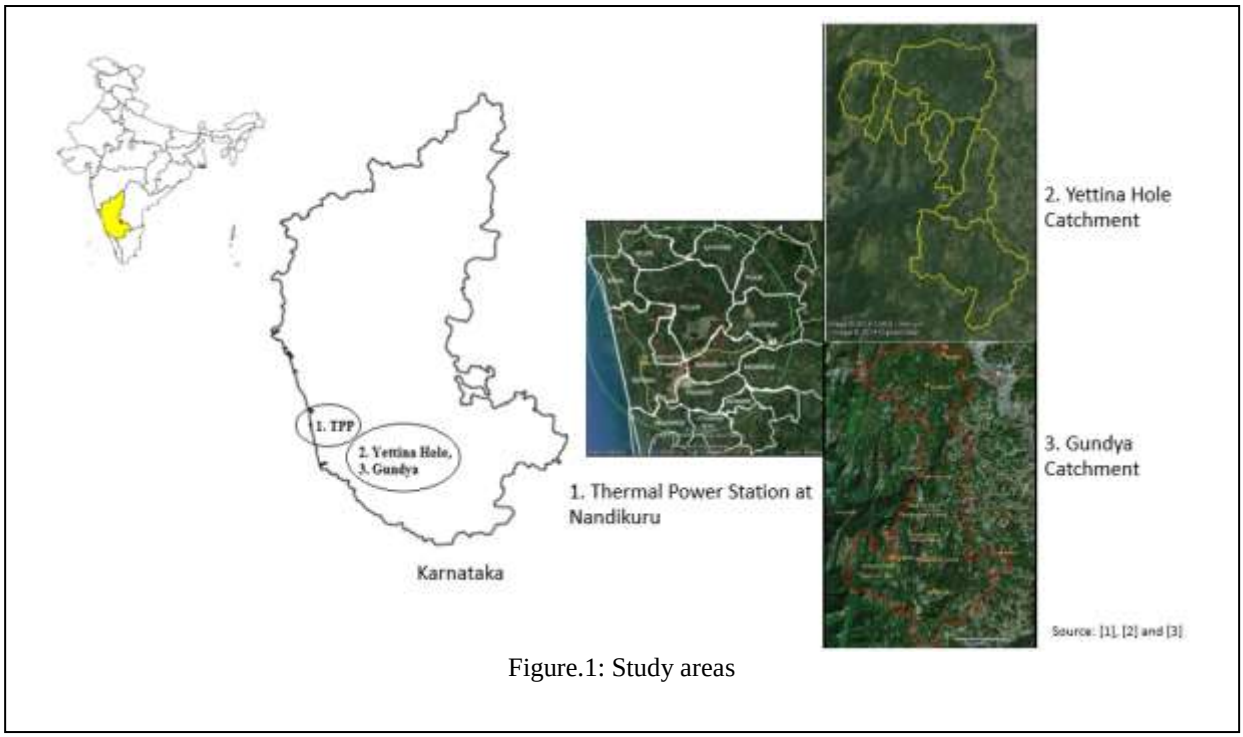


Figure.1: Study areas

water. Effluents are directly led to the sources of fresh water. Thereby polluting the surface and subsurface-ground water. The impacts are also in terms of phenological changes on the crop growth. A detailed impact on the environment has been discussed in discussion part.

### *B. The Yettinahole Project at Hassan*

The immense agro-trade activates of the districts near the coastal belt and the uplands such as Dakshina Kannada, Hassan etc., are dependent on the monsoon rainfall. The rainfall pattern of these coastal belts are mostly of orographic due to the presence of shield of the Western Ghats. The Western Ghats being a house of enormous flora and fauna also forms a diverse-hydrologically prominent space. The recent activity, specifically, watering the drought prone areas of Chikkaballapur, Kolar, Bengaluru Rural etc., through the most popular Yettinahole project has taken the glimpse of all. This paper revises the concerns on the environmental flow availability in the catchment and also the effects on the downstream. The first attempt of diversion of Yettina Hole was floated by G. S. Paramashivaiah and was aimed at providing drinking water for Hasan, Tumkur, Kolar,

Chikkaballapur, Bangalore Rural and Ramanagar districts. This entire project stated that there is no adverse effect on environment and there is no submergence of land and no need of rehabilitation of people. And the project will concentrate in tapping the water only during the rainy season i.e. from June to November. The proposed project is implementing by constructing dam/weirs for storing and lifting water. These weir sites falls in Sakaleshpura taluk of Hassan district of Karnataka, with total catchment area of 179.68 $km^2$.

As of now, there are two studies one being [5] and the other being [1] As per [1] although, Yettinahole project plans to divert 24TMC of water but the availability of water is only 9.55 TMC of which 8.68 TMC of water is used up there itself. The water demand for crop water requirement, domestic water requirement, livestock water requirement, evaporation losses etc., in the catchment is 5.84 TMC & water required for maintaining environmental flow is 2.84 TMC. These will sum-up to approximately 8.68 TMC and there is less than 1 TMC of water left. This may lead to a huge water load from flora-fauna and the downstream users on the catchment. The other alarming call to this ecologically fragile area is the Gundya Hydropower Project which also falls in the reaches of Hassan and Dakshina Kannada districts.

### *C. Gundya Hydropower Project in Hassan and Dakshina Kannada Districts*

Gundya River is formed by the Yettinahole and Kempuhole, along the course of the river which joins Kumaradhara a major tributary of Netravathi. The Gundia catchment receives south-west monsoon in the months of June to September. The forest of Gundia is the center of the Western Ghats [1]. The Karnataka Power Corporation Limited (KPCL) has proposed a hydroelectric project in the Gundya River basin in the Hassan and Dakshina Kannada district in two phases for about a total power of 400 MW. According to this project, water has to be transferred from the rivers Yettinahole, Kerihole, Hongadhalla and Bettakumari through a tunnel to the balancing reservoir from where it would be carried to the underground powerhouse at Gundia to produce power. Because of the fact that the project swallows large quanta of forest area, the ecology and the hydrologic regime of the river is under the great threat. A brief discourse of impacts of these above mentioned projects are presented in next section.

## III. DISCUSSION

This communication deals with reviewing three developmental projects falling in three different elevation zones of Karnataka. Two of them intends to balance the power demands of the state through power plants, the other aims on supplying water to the highland districts of Karnataka through a river diversion plan. In all three cases one can distinctively identify the impacts on the environment such as impacts on inland waters, estuary, forested watershed etc. While the TPP threatens mostly through its harmful effluents on air and water, the other two lying in uplands centered in the Western Ghats questions the availability of environmental flow to the ecology and downstream users.

In case of TPP, detailed project reports mostly aiming at environmental clearance dictate the disposal of diluted effluents to the sea water. And also shows plans to use the sea water as an input to the industrial processes. The latter case may be true in NPCL, but, the former case still remains as a direct disposal of effluents to inland waters and subsurface water. As the soil of this region, is laterite, possess high porosity which in turn have caused salinity intrusion into the groundwater. The effluents recharging to the groundwater have also high in heavy metals, possesses serious threats to the crop yields for a long term as well as bio accumulation related health problems. The other prominent effluent is in the form of fly ash which has completely reverted the phenological cycle of cash crops of this area. It has been observed that the fly ash waste mismanagement have led to the decrease in the rates of evapotranspiration and thus transpiration pull. The alterations in the soil pH due to the direct release of high metal contents have impacted the soil, resulting in reduced soil fertility or soil nutrients. Apart from these, high variation of pH has also lead to a decreased crop yield. As the socioeconomic profile of the population pertaining to this region depends solely on agriculture and agro-industries, these adverse impacts have directly threaten the lifestyle of the people. In subsequent context of Yettinahole, a wholly different scenario on water availability is presented. Ecological water crisis in Yettinahole and anthropogenic activities in case of Gundya projects have been highlighted.

Many proposals have been floated towards diverting water from Netravathi River, Yettinahole is one such. Available reports for lifting water in Netravathi basin are from G.S. Paramashivayya, Karnataka Neeravari Nigama Limited (KNNL), Prof. Mysuru Yadupathi Putty, and Dr. T.V. Ramachandra. While, KNNL and G.S.Paramashivayya's reports strongly accept the availability of divertible yield, but the reports from Prof. Mysuru Yadupathi Putty [5] and Dr.T.V. Ramachandra [1] disagree the availability of water as 24 TMC. The divertible yield calculated by above said reports show a diverse variability in terms of its value. The detailed project report and KNNL have estimated a flow of 24 TMC as a divertible yield, [5] and [1] have highlighted the importance of environmental flow for ecological requirements apart from the dependable total yield and divertible yield. Both [5] and [1] shows that there is a large conceptual lag in the methods of estimating runoff among other reports, which possibly conveys the divertible yield as 24 TMC. According to [5] the excess runoff as 2.75 TMC, whereas divertible yield proposed is 1.35 TMC for monsoon months. Estimates in [1] precludes the possibility of 24 TMC, instead says the availability of 9.5 TMC of water out

of which less than a TMC remains as divertible yield catering to the environmental flow.

As in elsewhere, Indian water planning and management considered water flowing to the sea as 'wasted'. Further, the approach was to harness river waters through dams and other structures to the extent that was technically feasible [6]. In this regard, most of the river diversion schemes aims to divert the water which are flowing to the sea as wasted. For this blind perception, Yettina hole is not an exception. The surplus water availability should also specify the maximum and minimum water which can be obtained in that particular basin. These flows ensure a flow regime capable of sustaining a complex set of aquatic habitats and ecosystem processes and are referred to as "environmental flows". In defining the excess flow from the available yield, [5] specifies to take a minimum flow corresponding to the second week of September. The report [1] deals with an elaborate methodology and discussion on environmental flow calculation. Yettina hole River is catering water needs within the catchment and downstream users with the existing natural flow regime. Both high and low flows are significant. High flows during monsoon transport nutrients, silt, etc., which gets deposited in the flood plains, river bed and estuaries. This helps the riparian's, aquatic life, human activities such as fishing, horticulture, agriculture etc. this is also true in the case of low flows. Most of the water fed to the outlet of Yettina hole is from headwater streams having stream order unity. There is a wide possibility of availability of water from these headwaters during monsoon, but pre-monsoon and summer days may saw a drier basin. The main concern that this communication raising through this is -the aalteration of hydrological regime. The proposed project would alter the hydrologic regime affecting the local ecology, biodiversity and more importantly livelihood of people in the region. Monsoon pattern will be greatly affected as the Western Ghats plays a vital role in bringing rains to Mangaluru and other parts of Karnataka. In turn this project would lead to the loss land cover, scattered forest patches.

Similar instances have been found in Gundya power project. The power generated through these small hydro power projects in Karnataka accounts for roughly 4.4 per cent of the total energy, environmentally leaving at least 3.7 km of river bed dry in a very small area which certainly bound to affect the wildlife and ecosystem of the area. The Gundya power project is expected to inundate more than 400 ha of forest covers [4]. It is seen that considering the ecological flow of 30-50 percent for each six-month period, the energy generation may reduce by 24 percent.

Some adverse impacts are: changes in hydrological regimes in the river basin due to project, threat on habitation of the wildlife endangering the rare species, submergence of patches of riparian forest, and most importantly the effects will have multi facet impacts on river-habitat-human link.

## IV. INFERENCES

An attempt being made to list-out and discuss the impacts of developmental projects on the environment. Three different development projects have been analyzed for their effectiveness and impacts on local ecology. It is true that these developmental projects, mostly power generation projects, imparts increment to the global development measure-GDP, but are not free from adverse effects. Most of the projects are viewed as environmental benign which again rises questions on environmental impact assessment process. It is the call of the time to cater the needs (may be power or water) of the population, utmost care also have to be taken on conservation of ecology.

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