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# Comprehensive Environmental Impact Assessment (Botanical and Zoological aspects) of the Proposed Puyankutty Hydroelectric Project, Kerala



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D Stephen and P Kannan

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Salim Ali Centre for Ornithology & Natural History  
Coimbatore, Tamil Nadu  
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## SUMMARY AND CONCLUSION

Kerala State Electricity Board (KSEB) proposes a major hydroelectric project, namely Puyankutty Hydro Electric Project - Stage I (PHEPS-1), across the river Puyankutty (also spelt Pooyamkutty), a tributary of the river Periyar. The project area is located near Puyankutty village in Idukki district of Kerala. The estimated cost of construction and related activities is Rs. 820 crores as per the assessment of KSEB in 1998. The PHEPS-1 features 240 MW installed power generation capacity. The project envisages construction of two dams, water conducting system (tunnel and penstock) and a power house. The main dam will be located 500 m upstream of Pindimedu waterfalls across the river. The maximum height of the dam from the bed level (+192 m above MSL) will be 148 m. The second dam in the PHEPS-1, the saddle dam, is 50m high from the saddle level (+290 m above MSL), with a Full Reservoir Level (FRL) of +338m across the Kumpanpara saddle. It is located approximately 10 km from Pindimedu. The gross storage of the reservoir at FRL will be 1226 Mm<sup>3</sup> of which the live storage is 1021.5 Mm<sup>3</sup>. As per the KSEB (1984) the estimated total submergible area of PHEPS-1 is 2800 ha.

The project awaits clearance from the Ministry of Environment and Forests (MoEF), Government of India under Forest (Conservation) Act 1980. The MoEF constituted an expert committee chaired by Professor M V Nadkarni, Institute for Economic and Social Change, for examination of the proposal. The committee recommended i) Ecological Impact Assessment, ii) Social Impact Assessment and iii) Cost-benefit analysis of the project before proceeding with the work of the project. The impact assessment of the PHEPS-1 on biological environment was entrusted to the Salim Ali Centre for Ornithology and Natural History, Coimbatore.

The terms of reference of the study are to find out: i) the threatened plants and animals of the area and their endemism; whether endemism is with reference to Western Ghats, Kerala or to the specific forest facing submergence under the project?, ii)

population of economic plants of the area and adequacy of mitigatory measures, and iii) elephant population in the forest to be affected; their corridors, and the likely impact on them.

Standard methods were used to survey the floral and faunal components. Field surveys in 314 km<sup>2</sup> were undertaken from January 1998 to January 1999 to gather primary data. Forty three localities were sampled covering both submersible and non-submersible areas to generate data on the occurrence, distribution, abundance and status of various plant species and vertebrate taxa. Samplings were done in pre-monsoon, monsoon and post-monsoon seasons.

The Puyankutty catchment is a mosaic of various types of vegetation, namely evergreen, semi-evergreen, moist-deciduous, riverain, reed-brakes, grasslands and plantations. Human habitations are also present in the catchment. Of the 2800 ha under submergence due to the project, 68% is forest, 24% shrubs, fallows and grasslands, and 6% rocky outcroppings. Riverain, low lying evergreen forests and reed brakes, which are rare in the country form the major portion of the submergence area.

Three hundred and twenty six plant species were recorded from the project area during our field survey which include 132 trees, 139 herbs, 39 shrubs, 8 epiphytes, 6 climbers and two liana. An additional 200 species were recorded in earlier studies. Thus the total number of plants recorded from the area is 526. Five endangered / rare / vulnerable plants species; *Humboldtia bourdilloni*, *Ochreinauclea missionis*, *Antistrophe serratifolia*, *Pterospermum reticulatum* and *Willisia selaginoides* were recorded. Economically important plants recorded in the project area include medicinal plants, reed (*Ochlandra* sp), wild relatives of cultivated plants and timber yielding trees. 29 species of medicinal plants used in Ayurveda system, 98 species used in other systems of medicine, and 35 timber yielding trees were recorded from the project area and its environs. More than 2.25 lakhs trees of various sizes are present in the submergence area of PHEPS-1. These trees have a timber volume of 17 lakhs m<sup>3</sup>.

Butterflies belonging to 32 species were encountered. 289 species of vertebrates (fish - 34, amphibians - 22, reptiles - 43, birds - 168, mammals - 22) were recorded during the study. About 25 elephants were estimated to be present in Puyankutty during the study period. The proposed reservoir would lead to severe habitat loss and obstruct the movement of elephants, as Puyankutty is one of the core areas of a large elephant habitat having viable breeding population.

Among plant species recorded, 61 are endemic to the Western Ghats and Peninsular India, of which *Anacolosia densiflora*, *Begonia albo-coccinea*, *Dysoxylum malabaricum*, *Hopea parviflora*, and *Sonnerila wallichii* were common. Of the total 32 species of butterflies observed in the area, two (*Papilio dravidarum* and *Pachliopta pandiyana*) were endemic to Western Ghats. Puyankutty area is extremely rich in endemic vertebrate fauna of the Western Ghats (16 species of fish, 11 amphibians, 10 reptiles, 11 birds and 2 mammals). However, no species of plants and animals recorded during the study was exclusively endemic to the Puyankutty forests. Of the 34 fish species two, namely *Hypselobarbus periyarensis* and *Garra mcClellandi* are confined only to select pockets in the Periyar basin. *Garra surendranathanii*, a species recently described from the upstream of river Chalakkudy, was also seen in certain pockets in Puyankutty area. Among the amphibian endemics, notable were *Nyctibatrachus beddomii* and *Rana aurantiaca*. *Geoemyda silvatica*, *Indotestudo forstenii* and *Mabuya clivicola* are little known endemic reptiles. 11 out of 16 species of birds endemic to the Western Ghats are present in Puyankutty. This is the highest number that has been reported from any part of the Western Ghats. Among them, *Psittacula columboides* (Bluewinged Parakeet), *Tockus griseus* (Malabar Grey Hornbill), *Megalaima rubricapilla* (Crimsonthroated Barbet), *Muscicapa pallipes* (Whitebellied Blue Flycatcher) and *Nectarinia minima* (Small Sunbird) were common.

Nine species of reptiles, two of birds and 14 of mammals found in Puyankutty are endangered as per the Wildlife Protection Act (1972).

The four major unique features of Puyankutty area are: i) **vegetation:** a mosaic of a variety of vegetation types such as evergreen, semi-evergreen, moist-deciduous, riverain and reed-breaks, 2) **presence of low lying evergreen forest:** vast stretches of such low lying evergreen forest is extremely rare in the country, 3) **endemicity:** a large number of endemic and threatened species, and 4) **crucial geographic position:** Puyankutty acts as a contiguous habitat forming a large conservation unit for viable populations of many species of mammals and birds. There is no known area in the Western Ghats other than Puyankutty where the endemicity is so high.

The benefits from the project as described by the KSEB in their project document no way match the loss of biological resources. No attempt has been made to evaluate the total cost of the project which must inevitably include the cost of biological resources, genetic potentials of various species of plants. Timber loss is only a part of it; more important is the genetic potentials of the variety of herbs and shrubs. Rs. 820 crores shown as the cost of the project is only the expenses for executing the project. One has to estimate the value of the biological resources also to indicate the total cost of the project. It will certainly outweigh the modest benefits that we may get from the project.

The present assessment of the biological resources of the area unequivocally concludes that the Puyankutty area has to be preserved for posterity at all cost. Protection of the entire forest currently available in Puyankutty is vital for a long-term conservation of the biodiversity of the area.