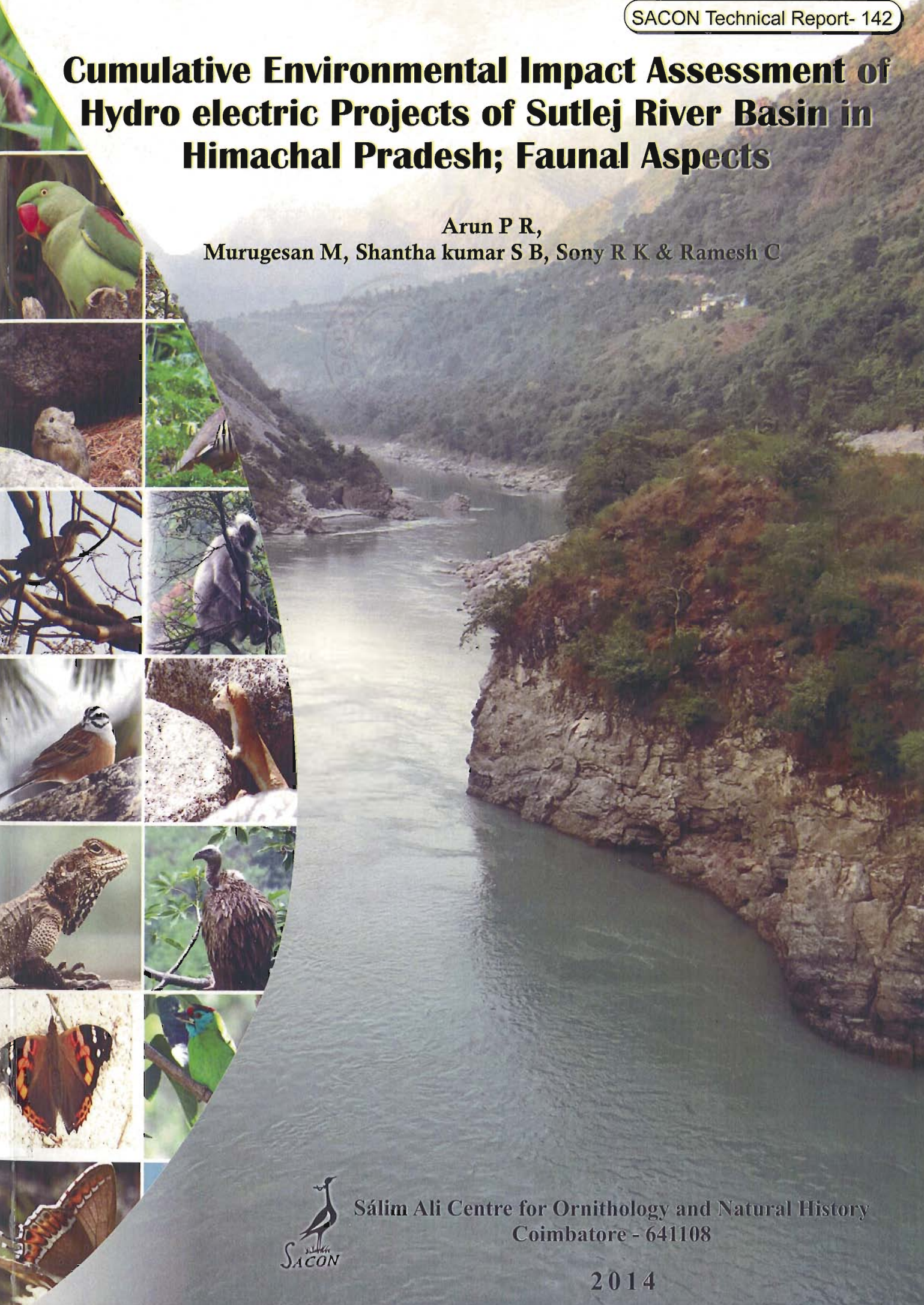


# Cumulative Environmental Impact Assessment of Hydro electric Projects of Sutlej River Basin in Himachal Pradesh; Faunal Aspects

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# **CUMULATIVE ENVIRONMENTAL IMPACT ASSESSMENT OF HYDRO ELECTRIC PROJECTS OF SUTLEJ RIVER BASIN IN HIMACHAL PRADESH-FAUNAL ASPECTS**

Submitted to  
ICFRE, Dehradun



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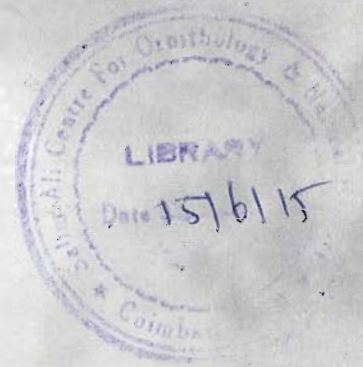
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## EXECUTIVE SUMMARY

The state of Himachal Pradesh accounts for about 25% (21,244 MW) of the estimated hydropower potential of India. Himachal Pradesh holds the major projects such as Nathpa-Jakhri (1500 MW), Karcham-Wangtoo (1000 MW), Koldam (400 MW) and many other hydroelectric projects which are having generation capacities ranging from 9 to 775 MW. Right from the upper reaches in the Kinnaur district down to Bilaspur district of Himachal Pradesh, the Sutlej River has been used for construction of several private and public hydroelectric projects. These hydroelectric projects are mainly supplying power to Himachal Pradesh and other North Indian states. Hydroelectric projects do not produce any by-products (solid waste like ash etc.). However, various hydropower related activities such as construction of dams, tunnels and Power houses and the resultant changes such as Submergence by reservoir, diversion of water and altered river courses and flow rates can affect the surrounding environment including flora, fauna, people's livelihoods, local hydrological setup and even climate.

Keeping the above facts in mind, the Department of Energy, Government of Himachal Pradesh and Ministry of Environment & Forests, Government of India, had assigned the task of the cumulative Environment Impact Assessment (cEIAS) of hydroelectric projects along Sutlej basin to Indian Council of Forestry Research & Education (ICFRE), Dehra Dun. ICFRE took up this study in collaboration with three other partner institutions. Among the three partner Institutions, Salim Ali Centre for Ornithology and Natural History (SACON) has taken up the study of Terrestrial fauna and Avifauna of the Sutlej river basin covering the faunal aspects among the overall ToRs of the cumulative EIA. The study covered the following aspects namely, 1) Inventory of avifauna and other terrestrial fauna from Primary & Secondary sources 2) Evaluation of conservation importance of species (RET, Endemics etc.) 3) Identification of existing protected areas 4) Threats to wildlife an Existence of Barriers and Corridors for Wild Animals 5) Identification of ecologically sensitive areas 6) To assess the cumulative impact of Hydropower projects on fauna along the Sutlej River. Prepare the suitable Environmental Management Plan (EMP) and mitigation measures to reduce these impacts on fauna and rivers.

The present study employed a duly modified methodology adapted to collect maximum data from within the limited time frame and in the harsh field conditions. It involved an optimal sampling strategy to best address the data requirement. The sampling locations were selected ensuring coverage of the entire elevational range available in the area (with a minimum elevational precision of 200 m) as well as covering all the 38 hydropower project sites under the study.

The entire Sutlej basin was divided into the following three zones for the convenience of the present study. Upper zone (zone I) (Khab to Kunzum Pass), Middle zone (zone II) (Nathpa to Khab), Lower zone (zone III) (Koldam to Nathpa). Data collections were carried out from permanent points and transects fixed in various habitats including project & non-project sites (control sites), forests, tributary, agricultural fields, human habitation etc. Opportunistic observations were also made for overall documentation of various faunal groups and to record species richness of the area. Survey points in each zone reflected various degrees of slope. We have made seasonal replicas in the same areas in the consecutive field trips.

Faunal importance of project sites at various levels was compared starting from the individual project level up to the basin level. **zone I** had five hydroelectric projects sites. Of these, Chango-Yangthang project site is obtaining clearances and Young Thang Khab, Sumte Kothang and Lara Sumta sites are under investigation. A total of 40 permanent points and 12 transect were fixed in this zone for documenting various fauna of this zone. In **zone II**, located in between Nathpa and Khab, 18 hydroelectric project sites were located. Of these SVP-Bhaba, Karcham Wangtoo and Baspa-II project sites are commissioned, Kashang-I, Kashang-II & III and Tidong-I are under construction, Himani Chamunda Thingri, Masrang Selti, Roura-II, Rala, Brua, Shongtong Karcham, Jangi Thopan Powari and Wanger Homte sites are obtaining clearances, Kashang-IV, Tidong-II, Nisang and Khab are under investigation. Totally 60 permanent points and 12 transect were fixed in this zone to study the various faunal communities. **Zone III** had 15 hydroelectric project sites located within. In that Sumej, Ghanvi-I and Nathpa Jhakri project sites are already commissioned, Kol dam, Rampur, Ghanvi-II, Kut and Sarong projects are under construction, Umli, Nanti, Upper Nanti, Jeori, Barakhamba and Jongini sites are obtaining clearances, Luhri and Kurpan-II sites



are under investigation. To study the terrestrial fauna and avifauna, a total of 69 permanent points and 12 transects were fixed in this Zone.

A total of five sets of field visits were made to the study area covering different seasons. Initial reconnaissance survey was conducted in June 2012. The second field survey was conducted from 15th July 2012, third from 10th October 2012, Fourth from 5th February 2013 and fifth from 12th March to 20th April 2013. Total 118 locations (96 point counts and 22 transect counts) sampled for primary data collection. Apart from these, 554 opportunistic observation points were also covered during the study.

**Faunal Inventory:** A total of 610 faunal species under the select faunal groups were recorded. It included 118 species of butterflies, 13 species of amphibians, 37 species of reptiles, 368 species of birds and 74 species of mammals. Forty-four species of migratory avifaunal species were recorded from the area (31 winter visitors and 12 summer visitors). Also 111 (30.16%) species were residents and local migrants with local and temporary movements, and 168 (45.65%) species are resident Birds of the area. Twenty-four threatened species as per the IUCN status are represented in the basin. There were no narrow endemic faunal species recorded from the area during the study. Seven bird species endemic to western Himalayas are also present in the area. The middle elevation zones had higher conservation important faunal species.

The cumulative analysis showed that the proposed HEP sites and the middle elevation area projects generally had maximum faunal wealth. The water dependent bird species such as Forktails, Dippers and Redstarts were found exclusively associated with the tributaries of the Sutlej with clear waters in the Rhithron zones. Changes in the flow pattern and water quality parameters caused by hydroelectric project developments in the higher elevation zones of the tributaries especially in the zone I and II will impact such avifauna the most. Among the three zones, the middle zone is most important habitat for the wild fauna especially between 2000 and 3000 m elevation followed by the lower zone. Relevant mitigation and management suggestions with respect to faunal species such as Pheasants and Snow Leopard are also discussed in the report.

**Recommendations:** From the faunal perspective, the hydropower development activities will lead to creation of more lentic (stagnant) habitats and decline in lotic (running water) habitats. This would lead to corresponding changes in the faunal communities especially

Birds and aquatic fauna. The Sutlej basin of Himachal Pradesh is crucially important for the endangered mammal species, Snow Leopard (*Panthera uncia*), and for the vulnerable bird species, Cheer pheasant (*Catreus wallichii*). Currently there are efforts going on in the area for the conservation of these species. Initiatives towards strengthening the long-term conservation of these species are recommended for sustainable development of this region.

For the Cheer pheasant, the lower zone (zone III) is the important habitat. There is good population of these Birds in and around the Majathal Wildlife Sanctuary near the Koldam project. Since some of the potential habitat patches of this species are present outside the protected areas, community conservation reserves may be developed in these regions with appropriate incentive schemes for public participation.

The Proposed/under investigation projects in the zone I area (Chango-Yangthang, Khab, Lara Sumta, Sumte Kothang and Young Thang Khab) are located close to Kibber WLS and are possible Snow Leopard habitat. Any further disturbance to this system should be avoided and ongoing and planned conservation efforts need to be strengthened through supporting appropriate long-term studies on Snow Leopard populations need in consultation with Wildlife Institute, Forest Department and other relevant organizations to effectively monitor and conserve this endangered species.

Apart from the above two species, there are other sensitive and threatened faunal elements as well as several river/ stream associated species that prefer the pristine conditions along the river courses. Strict maintenance of environmental flow and monitoring the compliance of the same by a competent panel including ornithology, wildlife, fishery and hydrology experts is recommended.

The impact on fauna will be maximum during the construction phase. Taking up one project at a time in a sub basin and leaving at least an year's time before initiating the work on any other project falling within 10 km radius or within the same sub-basin can greatly help in minimising the disturbance levels closer to the resilience capacity of the system and reestablishment of fauna and flora to the project environs post construction.