

# Disappearing rivers – The limits of environmental assessment for hydropower in India

Alexander Erlewein\*

Department of Geography, South Asia Institute, University of Heidelberg, Im Neuenheimer Feld 330, 69120 Heidelberg, Germany



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## ABSTRACT

The mountain rivers of the Indian Himalaya possess a vast potential for hydropower generation. After decades of comparatively modest development recent years have seen a major intensification in the construction of new hydropower dams. Although increasingly portrayed as a form of renewable energy generation, hydropower development may lead to extensive alterations of fluvial systems and conflicts with resource use patterns of local communities. To appraise and reduce adverse effects is the purpose of statutory Environmental Impact Assessments (EIA) and corresponding mitigation plans. However, in the light of ambitious policies for hydropower expansion conventional approaches of environmental assessment are increasingly challenged to keep up with the intensity and pace of development. This paper aims to explore the systemic limitations of environmental assessment for hydropower development in the Indian state of Himachal Pradesh. Based on a qualitative methodology involving interviews with environmental experts, document reviews and field observations the study suggests that the current practice of constraining EIAs to the project level fails to address the larger effects of extensive hydropower development. Furthermore, it is critically discussed as to what extent the concept of Strategic Environmental Assessment (SEA) might have the potential to overcome existing shortcomings.

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## 1. Introduction

Power consumption in India is soaring. While generation capacities have almost been doubled within the last decade the ever increasing energy demand of the subcontinent's growth centers continues to outstrip supply by approximately 10% (CEA, 2011). A major focus of the government's efforts to downsize supply shortfalls lies in expanding hydropower capacities. The implementation of the so-called '50,000 MW Initiative' aims to boost hydropower's share of the total electricity generation from around 25% to 40% (ADB, 2007; CEA, 2008). The basis for such a massive expansion is the vast and so far only partially tapped potential of rivers in the Indian Himalaya where steep river gradients in combination with high seasonal run-off rates provide ideal conditions for hydropower generation. At the forefront of the recent dam-building boom in India is the state of Himachal Pradesh which aims to become the "hydropower state of the country" (GoHP, 2010: 56) by almost tripling its generation capacities from 6371 MW in 2007 to 17,730 MW in 2017 (HPSEB) (Fig. 1). Most upcoming projects are destined to generate electricity 'for export only', that is, to the neighboring states of Punjab and Haryana as well as to the capital region Delhi. The high demand makes the export of energy a lucrative option for the economic development of the state, and led the government of Himachal Pradesh to declare the sale of hydropower,

or in the case of private operators the taxing thereof, to become "the principal and perennial source of revenue for the state" (GoHP, 2005: 123).

While the expansion of hydropower capacities fosters the economic development of the state, it also leads to environmental damage and to conflicts about the re-allocation of land and water resources (Chhatre and Saberwal, 2006; Erlewein, 2012; Him Dhara, 2011; Sinclair and Diduck, 2000). Mountain rivers are converted into cascades of power projects, thereby altering ecological conditions and leaving little space for original habitats. Most notably, the repeated diversion of rivers into head race tunnels dries up large parts of the riverbed and virtually results in the 'disappearance' of long river stretches (Figs. 2, 4 and 5). In view of such substantial ecological and socio-economic transformations the question arises as to what extent India's current system for Environmental Impact Assessment (EIA) is in a position to appraise and reduce environmental impacts and how this position might be strengthened. Most research focuses on evaluating the compliance with existing EIA procedures. For example Goel (2000), Nandimath (2009), Paliwal (2006) and Panigrahi and Amirapu (2012) have studied the effectiveness of the Indian EIA system in different sectors including dam-building, all concluding that there are considerable discrepancies between legislation and implementation. In contrast, there is little research investigating the legislation's inherent limitations and the potential of other assessment instruments to improve environmental decision-making for hydropower development in India (Agrawal et al., 2010). The objective

\* Tel.: +49 6221 548928.

E-mail address: [erlewein@sai.uni-heidelberg.de](mailto:erlewein@sai.uni-heidelberg.de).

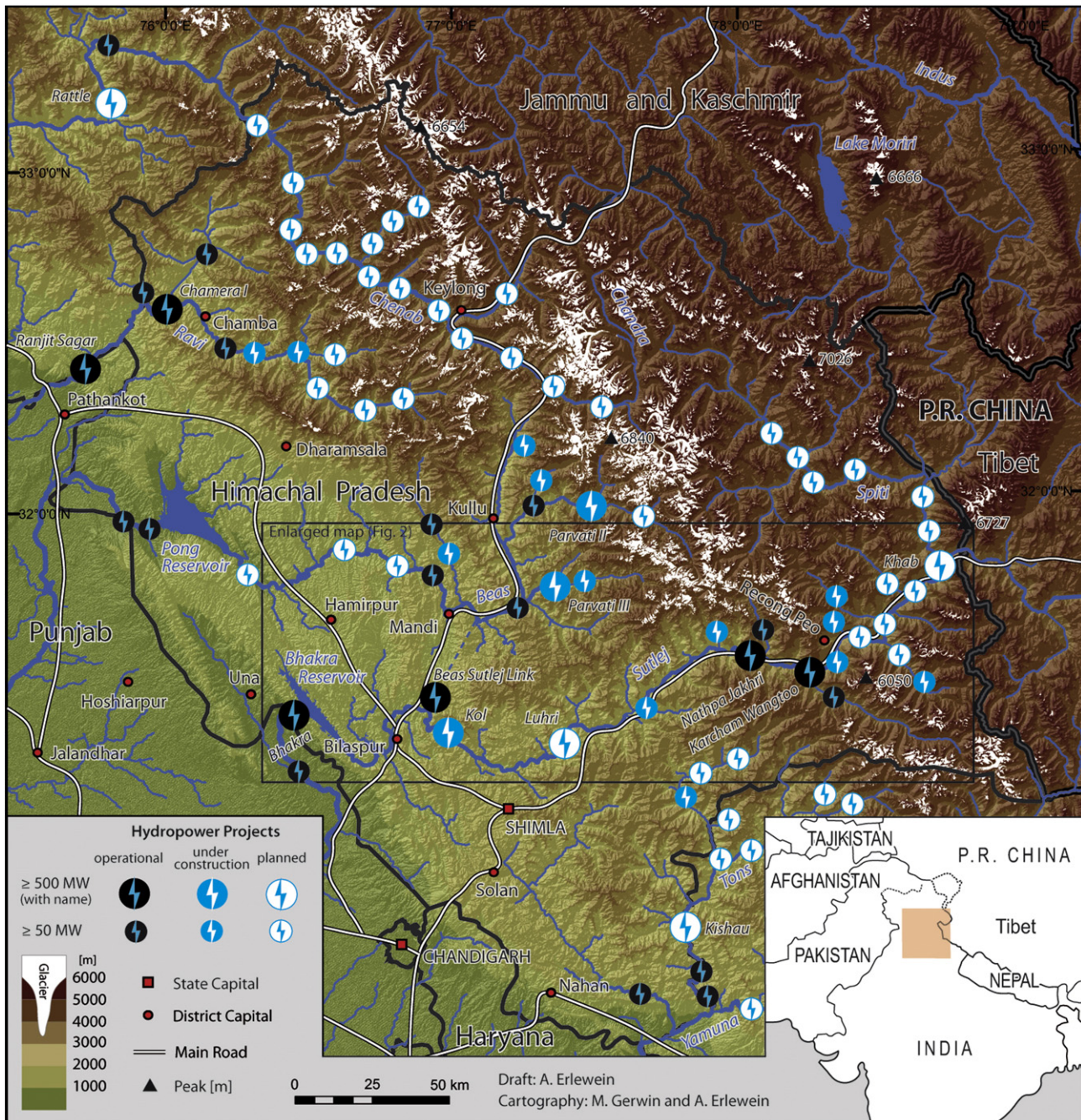


Fig. 1. Map of hydropower development in Himachal Pradesh. Data sources: geo-referenced SRTM data; Landsat ETM+; HPPCL, 2010; HPSEB, 2013; SANDRP, 2013.

of this paper is to contribute to the latter points. Focusing on hydropower development in Himachal Pradesh this study aims (I) to identify the systemic limitations of the current system for environmental assessment and (II) to discuss to what extent the often proposed but so far not implemented concept of Strategic Environmental Assessment (SEA) has the potential to overcome existing shortcomings.

## 2. Methodology

This study is based on a qualitative research approach. Data collection included 52 interviews with environmental experts and local stakeholders, an extensive review of the academic literature, policies and planning documents and personal observations during three field visits to numerous project sites along the rivers Sutlej (Kol Dam Hydroelectric Project (HEP), Nathpa Jakhri HEP, Karcham Wangtoo

HEP and Tidong II HEP), Beas (Allain Duhangan HEP) and Baspa (Baspa II HEP) in Himachal Pradesh (Figs. 1 and 2).

In order to capture the heterogeneity of expertise, perceptions and interests, the interview sample included experts from the public, private and civic sector:

- 9 representatives from state authorities involved in hydropower development in Himachal Pradesh: State Directorate of Environment/Pollution Control Board, State Directorate of Energy, State Directorate of Fishery, (Sub-)District Magistrates
- 8 representatives from major hydropower companies in Himachal Pradesh and associated organizations: Hydropower Producers Forum (HPPF), Himachal Pradesh Power Corporation Limited (HPPCL), Satluj Jal Vidyut Nigam Limited (SJVN), Jaiprakash Hydropower Limited (JHPL), Allain Duhangan Hydropower Limited (ADHPL)

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