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A closer look at small hydropower projects in India: Social acceptability of two storage-based projects in Karnataka

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ABSTRACT

Associated with being green, clean and small-scale, small hydroelectric power (SHP) projects generally enjoy a positive image. In India SHP promises answers to issues such as meeting a growing electricity demand, facilitating lucrative investment opportunities, and climate change considerations. The features of being green, clean and small-scale have contributed to the assumption of SHP as an essentially uncontested technology.

Empirical studies questioning this assumption are scarce. Research on SHP has so far remained rather hypothetical and policy-level-focused. This article investigates the social acceptability of small hydroelectric plants in India by empirically looking at how people engage with these plants. It thereby underlines the importance of studying technologies in their local context. Based on a detailed case study analysis of two SHP projects in Karnataka, India, the article shows how SHP projects are contested on the local level. The engagement of local people played a crucial role in the contestation of the plants and led to significant and unexpected outcomes and effects.

The article highlights the importance of having a broader perspective in the development of SHP that goes beyond a mindset of technological fixes. This includes taking account of existing water infrastructure and a broader range of water users. The article shows that the implementation of SHP projects does not take place in a void. Rather, complex existing physical and social realities on the ground matter for the development and performance of SHP.

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1. Introduction

Associated with being green, clean and small-scale, small hydroelectric power (SHP) projects harbor promises. In India, these promises are mainly related to providing answers to three broad issues, namely the country's growing electricity demand, the facilitation of lucrative investment opportunities, and climate change considerations.

India's electricity demand is growing rapidly, while its electricity system is struggling with severe performance deficits comprising organization, access and supply alike [1]. Renewable energy technologies play a role especially with regard to the last one. In order to diversify the country's power generation mix, the Government of India (GOI) has issued several national policies to promote their further development [2,3]. As part of the renewable energy mix small hydropower accounts for about 13% of India's total grid-connected renewable power generation [4]. It thereby constitutes the second largest grid-connected renewable energy source after wind power.

While the mandate over large hydro projects rests with India's Ministry of Power, SHP with a capacity up to 25 MW are administered by the Ministry of New and Renewable Energy Sources (MNRE). MNRE considers small hydro projects as "one of the most attractive renewable source of grid quality power generation" [5]. It supports the promotion and development of small hydropower by encouraging plans of capacity addition and providing capital subsidies and preferential tariffs [3]. Facilitating conditions for private sector participation has helped to promote SHP as attractive business opportunities and interesting investment objects [6].

All this has contributed to the overall image of small hydropower as a technology that promises green (renewable) and clean (no CO_2 emissions) electricity on a small scale, often provided by private actors. This image fosters the assumption that – due to their features – SHP is an essentially uncontested technology. Contrary to large hydro projects, which in India have a long history of social contestation [7–13], SHP are not associated with large-scale submergence and its related environmental and societal implications. Thus, consequences of changing the water flow, issues of crop loss, resettlement and compensation claims, are acknowledged problems that are expected in the context of large hydro development – and not in connection to SHP [14–16]. This has led some to see SHP as an alternative to large hydro projects [17–19]. Accordingly, rather than societal challenges, impediments of the further development of SHP are seen much more in the lack of financing, and in regulatory and infrastructural issues [20,21].

This assumption about SHP as a socially uncontested technology also seems to underpin the scholarly debate. There is a large body of literature, which, in the case of India, has comprised a bandwidth of issues.

One theme in the debate has highlighted the potential that renewable energy sources provide for sustainable development in India [22]. Nautiyal et al. have detailed this for the specific case of small hydropower, arguing for the need to continue the establishment of new SHP projects [23]. A recurring argument in this context is the assumed potential of SHP projects in mitigating CO_2 emissions [24,25]. Abbasi and Abbasi provide one of the few critiques that have highlighted their potential adverse environmental impacts [26].

The analysis of existing policies and mechanisms forms another strand of research within the debate. Sharma et al. have recently provided an analysis of different existing national policies and strategies and stress the large untapped potential and overall importance of SHP projects in India's overall development [3]. Singh et al. have studied the mechanisms of renewable energy policies by concentrating on investment and fiscal related aspects [27]. This research direction is complemented by studies investigating questions of financing and cost optimization of small hydro projects [28,29]. A recent contribution of Laghari et al. exploring technical alternatives and new designs of small hydropower equipment points to yet another branch within the debate that concentrates on technical design issues [30].

The facilitation of SHP constitutes the general thrust of the ongoing debate. Accordingly, SHP research in India has concentrated on policy, financial, and technical conditions and contexts. The current research scope shows that SHP is not considered a worthwhile topic of study in the context of social contestation and acceptance. A consequence is the striking absence of empirical studies investigating how these plants are actually doing in practice.

Especially research in the field of Science and Technology Studies (STS) has contributed to the insight that the functioning of technologies in society not only depends on the technologies' technical performance, but is also linked to their societal embeddedness [31,32]. The question about the social acceptability of technologies in society ultimately corresponds to the democratic claim that people should have a say in the development of science and technology in society. Besides reasons of normativity, instrumental arguments, for example issued within the field of development studies, stress that people's engagement will raise the effectiveness and efficiency of development efforts by rendering them a voice and active role in the process [33].

This article investigates the social acceptability of small hydroelectric plants in India by empirically looking at how people engage with these plants. It thereby underlines the importance of studying technologies in their local context. It is only through these studies that we can learn about the social acceptability of technologies. Taking a closer look at SHP through the lens of engagement adds empirically grounded insights to the debate about SHP, which so far has remained rather hypothetical and policy level-focused. As will be shown, people's engagement may lead to unexpected design changes, and thus plays a significant role in the functioning of SHP projects.

2. Methods

Though SHP is developed all over India [34], research about the social acceptability of SHP plants in India is scarce. The material presented in this article aims to start filling this gap. It is framed within a qualitative research design. Qualitative research seeks to provide a rich, contextualized understanding of lived social experience through the intensive study of particular cases. Ethnographic field research was conducted in India at the site of two