

2014

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Recommended Citation

Rousseau, Elliott (2014). Hydropower Development in Himachal Pradesh: A Stakeholder Equity Analysis. *Undergraduate Review*, 10, 164-170.

Available at: http://vc.bridgew.edu/undergrad_rev/vol10/iss1/31

Hydropower Development in Himachal Pradesh: A Stakeholder Equity Analysis

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Elliott Rousseau is a graduating senior majoring in Anthropology and Geography. In the

summer of 2013, Elliott—along with students Steven Spicer and Darwin Werthessen—traveled to India with Dr. Madhu Rao (Geography) and Dr. Martin Grossman (Management) to study hydroelectric power development in the northern state of Himachal Pradesh. As recipients of the Shea Fellowship for Undergraduate Research Abroad, the group extends their gratitude to BSU’s Edward Minnock Center for International Engagement, Office of Undergraduate Research, and the Shea Scholarship Committee for making this experience possible. Elliott plans to continue studying Anthropology and Indian culture in graduate school.

Seen as the champion of green energy to some and environmentally disastrous to others, hydropower is a multifaceted issue. As it continues to be developed in India, some of the most remote locations and vulnerable people are being affected. This paper holistically examines the process of hydropower development in rural Himachal Pradesh. The locus of this study is tribal region of Bharmour Tehsil within Chamba District of Himachal Pradesh, India. Aspects pertaining to project commission, the consent process, and government-sponsored rural development schemes are examined, with emphasis given to equity among rural stakeholders. The nature of this project was exploratory and hypothesis-generating. A combination of secondary scholarly research and primary on-site data collection is used to analyze hydropower. Interviews were conducted with local villagers residing in Bharmour Tehsil. A questionnaire was also designed and administered. In addition to interviewing local people, several other stakeholders in the hydropower sector were interviewed, including government officials, hydroelectricity (hydel) developers, project engineers, and academic scholars.

BACKGROUND

The Demand for Renewable Electricity

As the second most populous country in the world, India has tremendous demand for energy. As it becomes further developed, India faces increased difficulty in meeting the energy needs through traditional means of power generation. This was illustrated by the world’s largest blackout, known as the Great Indian Outage, an event which occurred in July of 2012. The blackout caused nearly 700 million people to be without electricity. In response to these critical energy demands, India has worked to diversify the sources of its electricity to include renewable energy such as solar, wind, biomass, geothermal, and hydropower (Goswami 2012). This is reflected by Indian Ministry of New and Renewable Energy (MNRE), which identifies the availability of energy via clean power as a precept in their mission statement (*Ministry of New and Renewable Energy: Mission*, 2013). At the forefront of India’s thrust toward renewable energy, Himachal Pradesh has been uniquely suited for the run-of-the-river method of hydropower generation due to its terrain and government initiatives.

Hydropower—Myths and Realities

The generation of hydropower is thought to usually involve massive dams, such as the Hoover Dam, which impounds the mighty Colorado River and generates electricity for Los Angeles, California. Along with this image of a large dam is usually an even larger man-made reservoir. Indeed, in the United States of America, the vast majority of the hydropower generated is from large-scale hydropower projects (LHP), which use the reservoir power generation scheme. This is not true elsewhere in the world, where small-scale hydropower projects (SHP), between 5 and 25 megawatts (MW) provides a larger portion of power production in the hydropower sector. Additionally, there are other methods of hydel power generation that do not involve submerging land.

There are several types of hydropower plants. In India, the run-of-the-river scheme is popularly used to generate electricity. This involves tapping already flowing streams and converting the kinetic energy of the flowing water into electricity. The run-of-the-river scheme is generally the most viable option for SHP.

The makeup of a run-of-the-river hydel plant can vary slightly, but usually consists of the same components. In this method, water is diverted from its natural course at a location with a high enough altitude at the diversion weir. The water passes through a desilting tank, which separates the sand, silt, and other debris. The river then flows through a man-made tunnel, typically through a mountainside. On the other side, the water passes into the penstock, which is essentially a long vertical pipe which drops the water from a great altitude and creates the maximum height, and therefore, maximum power generation. At the bottom of the penstock is the powerhouse, which is where the turbines are housed. The water spins the turbines, generating electricity, and is discharged into the river at the point of confluence (Energy Efficiency and Renewable Energy, 2001).

The Hydel Sector of Himachal Pradesh.

When compared to other states in India, Himachal Pradesh is maintaining an above-average economic outlook. As one of the fastest growing states in India, Himachal Pradesh relies mainly on four sources for its economic growth: agriculture, tourism, cement, and hydropower. In particular, the abundance of perennial rivers enables Himachal Pradesh to sell electricity to neighboring states, such as Delhi, Punjab, and Rajasthan. Himachal Pradesh has an estimated 23,000 MW of hydel potential, which accounts for 25% of India's total hydel potential. Of this amount, 8,368 MW are already being utilized by hydropower projects in Himachal Pradesh, with an additional 3,805 MW in the process of being exploited (Himachal Pradesh: the abode of the gods, 2013).

Since Himachal Pradesh is abundant with hydel potential and few other economic resources, hydropower has been seen as key to continued economic development. Additionally, since LHPs have already been exhausted, there has been a turn toward SHPs. Although the Indian government has identified hydropower as a key source for renewable energy, the administration is not properly equipped to achieve efficient and timely construction of said facilities. For this reason, both the national government of India and the state government of Himachal Pradesh have introduced incentives in order to attract potential hydel developers from the private sector. These incentive packages make hydropower even more profitable to investors, as they can mitigate expenses (Singh and Vaidya, 2012).

Local Stakeholders

A side effect of an increased share that renewable energy has in the energy production is the decentralization of the distribution of energy. For this reason, Himachal Pradesh has achieved 99.9% electrification, even as India's least urbanized state (India's urban demographic transition, 2011). Often seen as the initial catalyst for development of commerce and industry, the availability of electricity has seemingly improved for all peoples in the State. Whether rural people can afford electricity is another question altogether.

In light of the enumerated encouragements by the government, hydropower is suited to rapidly increase in Himachal Pradesh. Having such a large amount of projects densely located sensitive ecological areas has raised concerns about the aggregate effects of hydropower (Kibler and Tullos, 2013). Interviews with government and non-governmental organization (NGO) officials have revealed a diversity of opinion regarding this issue. These opinions include the dismissal of any purported impacts of hydropower generation to the outright condemnation of hydropower due to these supposed impacts (Arjjumend, 2013). Where intellectuals largely disagree on this issue, local villagers are also not united. Responses from local people to the multiplication of hydropower projects on their lands widely vary, including total support, skepticism, and outright opposition (Sinclair and Diduck, 2000).

Although, Himachal Pradesh is considered to be one of the less destitute regions of India, certain areas within the State have seen greater levels of poverty, lower levels of education, and issues with infrastructure and access to health facilities (Sharma et al., n.d.). Particularly, tribal areas such as Bharmour Tehsil have been burdened by poverty, unemployment and problems related to education and access to healthcare facilities (Parmar, 1992). When confronted by such pressing issues, people cannot afford the luxury of being primarily focused on the quality of their environment, especially when the effects of hydro-

power are not so apparent. This does not mean, however, that rural Himachali people do not care about their environment and its effect of their lives. Rather, there is a focus by both rural Himachalis and officials in the hydel sector in providing for the basic needs of rural people. This attention overshadows any affect hydropower development may have on the environment. For this reason, government-sponsored rural development initiatives such as Local Area Development Fund (LADF) focus little on environmental impacts, and more on access to basic facilities (Singh and Vaidya, 2012).

LADF was created up by the government of Himachal Pradesh with the intention of ensuring local communities in project affected areas (PAAs) were receiving benefits from the development of hydropower projects. LADF mandates that 1.5% of SHP cost would be set aside for a committee to spend on local development on projects. After project completion, 1% of the power generated is given to the State and sold. The revenue from these sales is transferred to the LADF, creating continued revenue. The funds are deposited with the Deputy Commissioner, who holds them until they are requested by the relevant parties. Once development activities are requested, the Local Area Development Commission decides if the project is approved, as well as how much capital is spent. Typically, the funded developmental activities include but are not limited to construction of village connectivity (roads, bridges, footpaths), community centers, street lighting, temples, drinking water provisions, irrigation, improvement of schools, and sanitation (Singh and Vaidya, 2012).

Commission and Consent Process

The process of project commission follows a bureaucratic path. Developers must first write a preliminary feasibility report (PFR), stating the intended factors of the hydropower project to be built. The developer must then send their PFR to eight departments within the Indian government to receive a no objection certificate (NOC). Among these eight developments to sign the NOC, the first in the list is the local form of village-level governance known as the panchayat raj. An assembly of five respected elders who are elected into office, the panchayat raj exists in modern India to decentralize power (Indian Const. amend LXXIII). After receiving approval, the PFR is later drafted into a detailed project report (DPR) and an implementation agreement is created in order to plan to fulfill the details outlined in the DPR. The final step for a developer in the commissioning process is receiving techno-economic clearance. While this process may seem burdensome for the developer, it is widely known that bribery of officials, including members of the panchayat raj, is the key to achieving approval (Rao, 2011).

Interview Subjects and Questionnaire Administration

In order to learn the opinions of local people regarding hydropower, semi-structured interviews were conducted with rural Himachali stakeholder residing within PAAs of Bharmour Tehsil, Chamba District, Himachal Pradesh. These interviews employed open-ended questions to solicit stories regarding hydropower development and experiences with LADF. Most of the interviews were conducted in English, but some were conducted in the local dialect using a translator.

To supplement data gathered by interviews, a questionnaire was designed to collect further data on the matter. By surveying both the demographic makeup as well as opinions regarding hydropower development, relevant insights were derived. The questionnaire was written in English and translated into Hindi, India's lingua franca among its diverse lingual composition. Following this, the questionnaires were distributed to those within the study area to fill out and return. To aid in distribution, local knowledge was accessed in order to receive more responses. Several copies of the translated questionnaire were given to community gatekeepers who distributed them to local people before returning the completed copies.

Findings

Research conducted in the designated tribal areas of Bharmour Tehsil, Chamba District, Himachal Pradesh indicates that the government-sponsored system of hydropower development in the State exists primarily to continue hydropower development by any means necessary.

Since the central government of India experiences extraordinary pressure to increase the level of energy production—particularly among renewable energy sources—and the state of Himachal Pradesh relies heavily on hydropower for economic growth, the national and state governments collaborated to produce a unified hydropower policy (Ministry of Power, 2008). Because both governments rely so heavily on hydropower in Himachal Pradesh, any supposed unintended negative consequence of hydropower policy on local groups must be carefully scrutinized.

The current procedure by which hydropower projects are commissioned and constructed does not allow for an open dialog between all stakeholders. Particularly, consultation with local stakeholders remains nearly non-existent in project commission. Though final approval of these projects is only achieved through official sanction by the village-level panchayat institution, basic knowledge of hydropower remains minimal. This raises questions about the efficacy of the panchayat system, seeing that the panchayat raj is supposed to represent its local constituency. Instead, the rural population remains system-

atically uninformed of hydropower projects and markedly removed from the decision-making process. In the case that local resistance opposed to hydropower development forms, LADF seemingly acts as a tool to suppress dissent.

Whether or not local people were aware of the local hydropower project was initially explored. Results showed that 69.4% of local people were not aware of their local project prior to the beginning of construction. Once the project begins construction, local people inevitably become aware of its presence since blasting and deforestation occur during this phase. It is significant that local people are routinely unaware of the project prior to the start of construction. This indicates that hydel developers are consistently not achieving widespread consent from local people prior to project construction. Of course, hydel developers have a high incentive to avoid the involvement of the local population in case public opinion reflects anti-hydel development.

Reasons for local disenfranchisement in the consent process are varied. Since hydel developers are only required to receive approval from the panchayat, one might assume that the panchayat simply did not make its constituency aware of the project. However, during interviews conducted with the local population, it became clear that the panchayat members had a very tenuous grasp on hydropower policy themselves, thus raising more questions and concerns.

The low standard for education that characterizes rural regions of Himachal Pradesh is critical to understanding and responding to hydropower development and its effect on rural people. Research shows a general discontentment by rural Himachali people regarding the education system. Particularly, rural areas of Himachal Pradesh are prone to rampant levels of illiteracy. Recent census data shows that Chamba District has the lowest overall, male-specific, and female-specific literacy rates of the twelve districts of Himachal Pradesh. Just over three-quarters (77.22%) of Chamba males and less than half of Chamba females (49.70%) can read and write. Additionally Chamba District also shows the largest male-female literacy sex ratio of all districts in Himachal Pradesh, at 27.52% (Sharma et al., n.d.).

Though education is doubtlessly lacking, Himachali people regard receiving an education as important. For this reason, local people indicated that education is nearly ubiquitous for youth. The majority of majority of people encountered in the Bharmour Tehsil (83.7%) completed 10+2 education, India's equivalent of twelve years of schooling. Although most rural Himachali people are beset by high levels of poverty, Himachali people are often willing to make financial sacrifices so that their children receive a quality education. This is reflected by the

tendency for parents to enroll their children in private schools. Though private schooling is much more expensive, it is accepted that the quality of education children receive is higher. One Himachali father stated that he and his wife "want the children to be educated so that they'll have a better job. You know, in the future." His emphasis on his children's occupation seems to reflect the opinions of other Himachalis—farmers of Himachal Pradesh typically do not want their children to follow their footsteps. Indeed, the vast majority of respondents indicated their occupation as farming.

Educational opportunities are seen as one clear avenue to productive employment. For rural Himachal Pradesh, getting an education can be more than a formality—for the families and generations affected, it can make a real impact on their quality of life overall. If they want to succeed in attaining an education and embarking on a career path, rural people must first overcome a stigma often applied to tribal groups. India has been working to reverse the inequalities among certain population groups. For this reason, the government has designated many scheduled castes and scheduled tribes to allocate employment benefits to members of these groups. Within Himachal Pradesh, a diverse array of scheduled tribes exists (Srinivasan, 1988).

Depending on the climactic zone a tribe lives within, their demographic make-up, livelihood and subsistence practices, rituals, myths, and values differ. Tribes often have their own languages with unique scripts, but they use Hindi to communicate outside their native tongue. Each tribe constitutes a distinctive culture, with different traditions and practices, though most share universal principals. For instance, all tribes ascribe to some degree of Hindu faith. This is not to say that they are all exclusively Hindu. While some of the tribes are characteristically mainly Hindus, others adhere to diverse beliefs incorporating Hinduism, Buddhism, Animism, Islam, and Christianity (Bisht and Bankoti, 2004).

The study area of this project included villages along the Ravi River basin in the Bharmour Tehsil. According to census reports, Bharmour Tehsil of Chamba District has an overall population of just under thirty-thousand people (Sharma et al., n.d.). This region is the most densely populated of the tribal areas in Himachal Pradesh; 82.28% of the people are from scheduled tribe. The majority of the population of Bharmour Tehsil belongs to the Gaddi scheduled tribe. For this reason, Bharmour Tehsil is also referred to as Gaderan, or 'Land of the Gaddi' (Bisht and Bankoti, 2004).

The Gaddi people speak in the Gadi language and use the Tankri script, while with others colloquial Hindi and the Deva-

nagari script are used. A rugged and mountainous group, the Gaddi having adopted themselves remarkably well to live in the high altitudes of Bharmour Tehsil. The hilly subdivision has two mountain ranges running through it—the Dhauladhar and Zaskar—and altitudes ranging from 400–19300 feet above sea level. The climate in Bharmour Tehsil ranges from temperate to semiarctic. During the summer, the climate is moderate and pleasant. In October, snowfall commences and from December to March, Bharmour Tehsil is covered with snow. During these winter months, the Tehsil is separated from the rest of the country as the means of transportation and communication are disrupted. As a nomadic group, the Gaddi traditionally leave their homes in the fall season to avoid the harsh winter before returning in the springtime (Bisht and Bankoti, 2004).

The remarkable grandeur, and on the other hand, the ruggedness and severity of nature in Himachal Pradesh have influenced the culture the Gaddi. As a subsistence society, the Gaddi are traditionally dependent on the environment for food, fuel wood, fodder, raw materials, and more. This dependence has majorly influenced the cultural and social organization of Gaddi society, shaping them into hardy, strong, and kind people (Bisht and Bankoti, 2004).

The cultural practices of Himachal Pradesh's tribal population ordinarily do not align with western notions of progress and technology. For this reason, the concept of 'tribalism' has been applied by urban, non-tribal Indians, and westerners to describe a tribe's tendency to adhere to traditional ways of practice, rather than adopting modernized techniques (Gellner, 1991). Significant government-sponsored and NGO initiatives have attempted to demonstrate the benefits of modern technology to rural Himachali people. Rather than realize the benefits and adopt the techniques as outsiders suppose would happen, rural peoples tend to continue to use traditional methods. Among the Gaddi, this can be observed in their methods of cooking, which relies on wood.

One argument often used to justify the penetration of hydropower industry into rural Himachal Pradesh relates to the increased availability of electricity to rural people. Though other cooking methods are available, rural Himachalis principally use wood stocks to cook. Concerns have been raised that rural peoples are depleting the regional forest cover by harvesting wood for fuel. From a non-local perspective, electricity can be seen as a viable replacement to wood. However, although the State is essentially fully electrified, it has been shown that the rural people are not willing to convert from wood. This unwillingness to change their traditional ways of life is reflected by an MNRE initiative, which focused on teaching rural Himachalis

how to use liquid propane gasoline (LPG) to cook. Though a few did transfer to LPG, most people found it more convenient to continue their traditional practice of utilizing wood as a fuel source.

This idea of tribalism also permeates NGO initiatives in Himachal Pradesh. The first micro-hydropower demonstration projects in Himachal Pradesh were sponsored by the United Nations Development Programme (UNDP). One advantage of hydropower outlined by the UNDP relates to the division of labor—women are said to be freed from collecting fuel wood, maintaining fires, and other household chores. As previously stated, the assumption that rural peoples would perceive this as a benefit is highly unlikely. Studies have showed that rural Himachalis of Kullu District were not any more likely to use electricity over wood with a more reliable power grid. It must be mentioned that the assumption that people would completely alter their lifestyle to modernized techniques is shortsighted and ethnocentric at best (Sinclair, 2003).

Rural people in the study area were asked about their use of electricity and their cooking methods. Results indicate that electricity is used in diverse ways, but traditional methods of cooking with wood remain unchanged. The questionnaire revealed that the top uses for electricity were lighting (67.34%), communication (40.81%), and recreation (32.65%). The least popular uses for electricity were cooking (8.16%) and heating (10.2%). Although electricity, LPG, and cow dung are all alternatives to wood, 62.3% of respondents indicated they only relied on wood for cooking.

The UNDP also claims that local economic opportunities are increased with hydropower development. As mentioned earlier, electricity is often a catalyst for economic development. However, data collected conveys a different story. Among the respondents, only 15.4% saw hydropower as a positive economic opportunity, with 77% claiming there were no effects on the economy and 7.7% indicating negative impacts on the economy. These results reflect the inherent confusion and disunity surrounding hydropower, specifically with regards to economic opportunity. Further data revealed the overall feelings of local people toward hydropower (Sinclair, 2003).

Though proponents of hydropower hail its benefits, this does not wholly translate to the local people. Certainly, some local people are claiming to have received benefits from hydropower development. Several local hydropower employees encountered certainly received benefits, whether they were employed seasonally, part-time, or full-time. These economic benefits, however, are individual cases and cannot apply to the affected population at large. A report by Singh and Vaidya showed con-

vincing evidence for a measurable level of perceived negative impacts by rural peoples regarding hydropower development in the area (2012). Among the most frequently identified issues were adverse impacts to the environment (air pollution, water quality), cracks in the foundations of houses due to blasting, as well as impacts to livelihood and economic outlooks of project affected groups (Singh and Vaidya 2012). In our study, respondents indicated that overall, only 14.9% saw more positive impacts related to hydropower than negative. While nearly three-quarters of respondents indicated that hydropower had no negative effect on the environment, the remainder of respondents claimed there was either a “moderate” or “large” negative effect, a sizable portion considering the environmental significance of Himachal Pradesh.

During the course of the study, several informants indicated that the environment is an important concern of theirs. Research shows that project affected groups are becoming more conscious of problems associated with hydropower development. Additionally, grassroots groups protesting against hydropower have been identified. Within a context of poverty, unemployment, and lack of opportunities, however, rural communities become particularly vulnerable to those who advocate for the increased development of hydropower projects as an avenue for employment and economic development. Hydropower is presented to rural people as an opportunity for economic growth, referring to programs such as LADF. Thus, proposals that economic incentives be offered to mitigate local opposition to the establishment of hydropower projects raises troubling questions. In this manner, LADF can be seen as an attempt to coerce people to accepting hydropower development, rather than engaging in a meaningful dialog between parties.

Beyond the aforementioned issues, LADF also has implementation problems. Though rural stakeholders may be initially hopeful and encouraged by the prospect of LADF, they soon realize its complications. Namely, the lack of knowledge regarding the actual spending of LADF on a development project is frequently a problem. Important details that would allow villagers to write a proposal, a budget, and a timeframe are not readily available. Other withheld information includes the amount of capital in the fund, who holds the power to makes spending decisions regarding the balance, how long it takes to see results, and where the money is being held. As Bharmour Tehsil is particularly isolated, alternative means of obtaining relevant information are quite limited.

In one village, an informant detailed the fight to obtain schoolteachers for the village. Brhei was without schoolteachers for years due to vacancies. When a hydel developer arrived in town

with hopes of building a SHP, the inhabitants petitioned the developer for three school teachers. When the developer refused, the residents of Brhei went on strike. Residents blocked access roads to the construction site, causing financial and logistical issues for the developer. Around 4 months later, representatives of Brhei finally visited the Deputy Commissioner’s office, where a deal was struck. The residents of Brhei learned of LADF only when they were somehow able to travel to the provincial capital and arrange a meeting with a high level official. This logistical nightmare eventually resolved in Brhei receiving two teachers, one primary and one secondary.

This story can easily be seen as a success because the residents of Brhei received what they desired. As the subject also indicated, however, in future the people of Brhei will be abandoned in this matter: “As long as LADF funds exist, they’ll have a teacher,” he says. “Once the LADF funds don’t exist they have no teacher [through a translator]”. In this manner, LADF was utilized as a tool by the developer to temporarily placate the people in order to finish construction. As hydropower plants require little to no maintenance, the developer never has to deal with the population of Brhei again. Once the LADF funds run out, Brhei will be again without a teacher.

Discussion

By examining the construction and proliferation of hydropower in rural northern India, a complex and multifaceted conflict between local and national interests has been exposed. This research has allowed consideration regarding what is usually considered to be a non-contentious issue. Far from being a widely celebrated developmental activity, hydropower has instead showed its potential to be a highly contested and debated.

In the course of conducting research, some problems arose that hindered the full potential of this study. One major issue pertained to a language barrier—many Indians are not conversant in English. In addition, there are areas of rural India in which English simply is not spoken by most. For this reason, interviews had to be conducted via interpreters. Those who do speak English are more educated, and therefore of a higher caste. This fact made it difficult to represent all groups within the caste system. Resulting from the language barrier, the questionnaire had to be translated from English to Hindi. Filled out surveys then had to be translated back to English to be quantified. Due to mistranslation, one of the questions had to be discarded. Though these issues were recognized, the timeframe of the project did not allow for the issues to be properly resolved.

The short timeframe of the study provided for most of the difficulties. Due to the abrupt research period in the field, fewer than the ideal number localities were visited, people in-

interviewed, and questionnaires administered. Additionally, the time and effort taken to traverse the rugged mountainous areas of Himachal Pradesh provided for even less time in the field. Of course, three weeks is a short time period for any one project. Because an interdisciplinary team of researchers was traveling and researching together, topics of geology and business economy were also explored by the team. This further shortened each investigator's time to focus their research topic.

At this time, a determination of the aggregate benefits versus damages regarding hydropower cannot be offered. The mere fact that this is a looming question, however, gives reason to pause and scrutinize the situation. As an all-encompassing list of positive and negative impacts cannot be drawn up, a conservative approach is ideal. The widespread construction of hydropower facilities throughout the sensitive environment within Himachal Pradesh should be eased to allow for more research on its impacts.

Conclusion

Though a final determination cannot be made regarding the positive and negative association of hydropower, the current hydropower development policies are not without their flaws. In order to seek greater acceptance by local people, alternative measures must be sought. Access to objective information regarding hydropower facilities and production must be made available to the tribal population in order for them to be able to make an informed decision. Ultimately, people will make a decision that is consistent with their value system, but only if relevant information is both accessible and objective. Additionally, culturally biased modes of tribal interpretation must be halted in order for real progress between local people and hydel developers to be realized. Finally, a policy of free, prior, and informed consent should be pursued with regards to the local tribal people. Formally seeking consent from project affected groups will be critical to achieving their eventual support.

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