

Environmental Struggles: Case Studies of the Narmada Bachao Andolan and Tehri Dam Conflict in India

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Abstract

The construction of dams has significant environmental impacts, disrupting natural ecosystems and affecting biodiversity. Large-scale dam projects often lead to the submergence of vast areas of forest land, wetlands, and agricultural fields, resulting in the loss of valuable habitats for flora and fauna. The creation of reservoirs can alter water quality, affect fish migration, and reduce water availability for downstream communities. Water accumulates on the upstream side of the dam, potentially causing the inundation (flooding) of land, including forested areas. The Narmada Bachao Andolan (NBA) and Tehri Dam conflicts exemplify the complex challenges of development-induced displacement in India. This struggle influenced human rights discourse internationally and resulted in the creation of the World Bank Inspection Panel. Similarly, the Tehri Dam project exposed the disproportionate impact of displacement on tribal groups, indigenous groups, and women, stressing the need for inclusive resettlement policies. These movements have evolved from local resistance to multi-scalar campaigns, challenging the prevailing development paradigm and advocating for alternative approaches that prioritise human rights and environmental sustainability. This article examines the environmental and social impacts of the Narmada Bachao Andolan and Tehri Dam protests, focusing on the displacement of local communities and the resistance movements that emerged in response to these projects. By analysing the environmental consequences of dam construction, such as habitat loss and ecological disruption, as well as the social implications for affected

populations, including marginalised groups like tribals, the article sheds light on the broader challenges of development-induced displacement in India.

Keywords: Narmada Bachao Andolan, Tehri Dam Conflict, Displacement, Resistance Movements, Environmental Impacts.

Introduction

One of the effects of human activities is the construction of infrastructure, including dams for development. These development activities have a great environmental impact. Environmental impact refers to the potential effects of human activities, particularly those involving the utilisation of environmental resources, on the natural environment. These impacts arise from various developmental, industrial, and agricultural activities that interact with ecological systems, often leading to significant alterations in ecosystems, biodiversity, and the quality of air, water, and soil. The assessment and evaluation of environmental effects of human activities are called environmental impact assessment, which is used to identify and assess the potential environmental impacts of a proposed project to offer/evaluate alternatives and design appropriate mitigation management and monitoring measures (CBD, 2010). Dams are artificial walls constructed across a river to convert the running water ecosystem into a lake-type economic system, which can lead to basic changes in the riverine ecosystem (Lin, 2011). Thus, the development of dams sometimes leads to the generation of a lot of controversy. It is not only that the fragile ecosystem is in danger, but also the lives and property of the people who must move because of the great project.

Development-Driven Displacement

The major consequence of development has been the displacement of the tribal population as well as the

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marginalised communities. Their displacement is because of the reason that they live in the most fertile land, amidst forests, rapidly flowing rivers, and in areas with the most valuable minerals. The story of development and displacement is spread all over India. If people have been displaced in Jharkhand because of mining (Khan, 2024), the homes of tribal families were burnt in Odisha (Kissu, 2020), as well as the destruction of a community forest, which was destroyed by the Forest Department. (Nayak et al., 2019) Manipur is another example where the homes of people were demolished by the Forest Department because they had built the homes in the reserve forest area (Land Conflict Watch, 2022). On May 27, 2020, the government allowed drilling in the ecologically sensitive district of Tinsukia, Assam, which led to a fire that lasted for days (Chakravartty, 2020). Karnataka tried to dilute the Land Reforms Act of 1961 so that industrialists could buy land directly from the farmers (Karnataka Legislative Assembly, 2020). The government of Uttar Pradesh eased regulations by amending the Revenue Code and further simplifying land acquisition under the Land Acquisition Act of 2013 (Government of Uttar Pradesh, 2020). During the COVID-19 lockdown, the government of Gujarat tried to forcefully acquire the land of six villages around the Statue of Unity, to be sold to corporations to build luxury hotels (Raja, 2020).

As soon as the government and the vested interests realised the value of these minerals, the process of displacement of these people in the name of development commenced. The tribals who tended the forests and other natural resources with loving care are displaced to make way for commercial establishments, thus ruining Mother Earth. Walter Fernandez, a famous Indian sociologist, has said that at least 40% of the people who are displaced because of development projects are tribals (Fernandes, 2001). India has entered a new phase of development since 1991 because of the aid from the World Bank, International Monetary Fund, Asian Development Bank, World Trade Organisation, and Western governments. Liberalisation, privatisation, and globalisation (LPG) are the guiding stones of this development. The alienation and displacement of the Adivasis from their lands have accelerated after the entry of the Multinational Companies (MNCs). Projects led by them aim to promote economic growth but often disrupt the lives of local populations, leading to the loss of homes, livelihoods, and cultural ties.

Objectives & Methodology

The objective of the paper is to examine the environmental and social impacts of the Narmada Bachao Andolan and Tehri Dam protests, focusing on the displacement of local communities and the resistance movements that emerged

in response to these projects. The secondary data has been collected for this study, and it involves reviewing and synthesising existing literature, reports, and data related to the Narmada Bachao Andolan and Tehri Dam conflicts. This included academic journals, government publications, environmental impact assessments, reports from NGOs, media articles, previous case studies, etc.

The Sardar Sarovar Dam Project

The construction of the Sardar Sarovar Dam on the Narmada River in Vadgam village in the state of Gujarat is an example of Ecological Disruption and human displacement. It is built near the town of Kevadiya in the Narmada district. It is a gravity dam with a height of 138.68 metres. It creates the Sardar Sarovar Reservoir. The Sardar Sarovar Dam is a part of the Narmada River Valley project and prides itself on being one of the 30 large dams in the project. The foundation stone of the dam was laid by Pt. Nehru on April 5, 1961. It finally took form in 1979 because of the development scheme, which was funded by the World Bank through the International Bank for Reconstruction and Development (IBRD). The aim was to produce hydroelectricity and increase irrigation. The project aims to irrigate a 1.9-million-hectare area, most of which is drought-prone areas of the Kutch and Saurashtra regions. 75% of Gujarat's main area is drought-prone and the dam aims to meet the challenges of paucity of water in this state. The project ran into a lot of controversy because the river flows through three states: Gujarat, Madhya Pradesh, and Maharashtra. Disputes arose because of the sharing of resources, as well as the waters (Thakkar, 2010).

To solve this problem, the Narmada Water Dispute Tribunal (NWDT) was established in 1969 and gave its report in 1979, which was tried to be resolved by a report submitted by the NWDT, which took 10 years to reach conclusions. It also had to suggest the resettlement of the people displaced by the dams. It gave the decision that 135 medium, 30 major, and 3000 small dams would be built across the mighty river. The dam would provide water to around 40,00,000 people, along with helping with irrigation and providing electricity to the people in the area (Ministry of Jal Shakti, 2024). The NWDT, which was set up by the government of India, has given a policy under which the people who have been displaced should be rehabilitated. It aims to at least regain the living standard of the project-affected people that they were leading before displacement. Rather, the Tribunal wants to improve the standard of living of the people. It also says that people should be reintegrated into villages or areas of their preference so that there is integration with the host community. It also suggests that people should

be adequately and appropriately compensated for social and physical rehabilitation, which includes infrastructure and other community services. It advises the government to take the views of the displaced people while deciding their future.

The construction began in 1987, but by the ruling of the Supreme Court of India in 1995 was halted because of the appeal by the Narmada Bachao Andolan (NBA). The construction began again in 1999, as it had been stalled due to the efforts of the NBA, which worried about the displacement of the people. Under directions from the Supreme Court of India, the project was again revived in 2000-01, but with a lower height of 111 metres. The height was successfully increased to 123 metres in 2006 and 139 metres in 2017. It now stands at 163 metres. The length of the dam is 1210 metres. It was inaugurated in 2017 by Prime Minister Narendra Modi, though its construction was finished in 2016. It is the second-largest concrete dam in the world in terms of the volume of concrete, which has been used in its construction. A statue of India's first deputy prime minister, as well as Home Minister, who is also known as the 'Iron Man of India,' Sardar Vallabhbhai Patel, faces the dam. This statue is supposed to be the tallest statue in the world. It is known as the 'Statue of Unity.' It was Sardar Patel who had envisioned the dream of this project (Parthasarathy & Dholakia, 2011).

The main power plant of the dam houses six 200-megawatt Francis pump turbines (a type of water turbine that can achieve approximately 95% efficiency, named after the British American engineer James B. Francis) to generate electricity. It also includes a pumped storage capability. The Malwa Plateau of Madhya Pradesh lies to the west of the dam. It is here that the Narmada River dissects the hill tracts and culminates in the Mathwar hills. The dam is a case study to learn about Integrated River Basin Planning, Development, and Management. The reservoir is operated in the catchment area (The area behind the dam, which is also known as the drainage area, or watershed area. It is here that what collects after rainfall) during the monsoons in a manner that is well synchronised with the rain forecast. The responsibility for strategically maximising the annual allocation of water share rests with the River Bed Power House, which ensures that the minimum water flows downstream, and maximum water is used in the dam overflow, which is generally in the monsoons. It also takes steps to minimise conventional and operational losses and restrict water-intensive perennial crops by adopting underground pipelines and proper maintenance of canals (SSNNL, 2017).

The Narmada Canal is a contour canal (an artificially-dug navigable canal, which closely follows the contour

line of the land it crosses) in the western part of India. It transports water from the Sardar Sarovar dam to Gujarat and then to the state of Rajasthan. It has a length of 532 kilometres in Gujarat and then 74 kilometres in Rajasthan. After the Indira Gandhi Canal, it is the second-largest canal in India. But it is the largest canal by water-carrying capacity. After the project was completed, the Narmada Canal was inaugurated on April 24, 2008. It irrigates land spread over 12 districts and 3393 villages, 75% of which are drought-prone areas in Gujarat. The dam, from which it originates, provides drinking water to 9490 villages. It also provides water to 173 urban centres in Gujarat and 1336 villages in Rajasthan, along with three towns in Rajasthan. The dam also protects the area from floods. The government of Gujarat announced in 2000-11 its mega project to generate solar power by placing solar panels all over the canal so villagers would get power at subsidised rates (SSNNL, 2024).

About 41,000 families were displaced because of the dam across three states, Gujarat, Madhya Pradesh, and Maharashtra. Around 56% of the people out of the displaced people are Adivasis or tribals (Thakkar, 2010). Though the government says it has compensated the displaced people have a different set of grievances. Some complain of being given insufficient land, others talk about fragmented land, and still others say that they were given uncultivable or waterlogged land (Sikka, 2020). The sites do not have adequate grazing land, adequate clean drinking water or health facilities. This has led to the deaths of many people because of unhygienic living conditions. Many are facing the issue of malnutrition. Individual families have been compensated in some manner, but no one has been compensated for the common property resources that were enjoyed by the people in their village. They have been separated from each other. People living in the same village have been allocated land at distances leading to alienation from each other. The displacement has taken an emotional toll because families, as well as villagers, have been separated from each other. Moreover, it gives a nuanced understanding of how resettlement, far from simply being an economic challenge, is deeply intertwined with cultural disintegration, loss of livelihood, and changes in community structure and affects the emotions of the people. As a response to the grievances of the people affected by the Sardar Sarovar Project, the displacement and resettlement issues gave rise to a remarkable social movement, the Narmada Bachao Andolan (NBA). The NBA, which began in the mid-1980s, became a powerful voice for those displaced by the construction of the dam, particularly focusing on the environmental, social, and economic consequences for local communities.

The project leading to the Narmada Bachao Andolan (Save the Narmada River Movement)

The Narmada Bachao Andolan (NBA), a movement formed in 1989 by a coalition of native tribals, environmentalists, farmers, and human rights activists, has played a central role in protesting the Sardar Sarovar Dam project. Led by Medha Patkar and Baba Amte (who also published a booklet titled '*Cry the Beloved Narmada*'), the movement highlighted the lack of consultation with displaced communities and inadequate compensation (Amte, 1989). The NBA's efforts led to widespread mobilisation, transforming the issue into a significant mass movement.

The Sardar Sarovar Dam has been one of India's most controversial infrastructure projects. Critics argue that the dam's construction began without the necessary environmental and planning approvals from the Ministry of Environment and Forests and the Planning Commission. The World Bank, which initially funded the project, conducted an independent review (Morse & Berger, 1992) that scrutinised the potential environmental damages, particularly concerning the flooding of fertile land and its adverse impact on tribal communities. In light of these findings and the Indian government's failure to meet environmental requirements, the World Bank withdrew its support in 1993-1994 (World Bank, 1992). Official estimates suggest that about 42,000 families were displaced, while the NBA claims the number is closer to 85,000 families, or 500,000 people (Sikka, 2020). The Narmada Valley Development Project has, in total, affected the lives of over 25 million people residing in the valley (World Bank, 1992).

Medha Patkar, a central figure in the NBA, left her doctoral studies to advocate for the displaced people. Through her leadership, the movement organised large marches and peaceful protests, including multiple hunger strikes (a 22-day hunger strike in 1991). Patkar's activism, which even led to her arrest in 1994 for opposing the relocation of villagers in Manibeli (Nandurbar District, Maharashtra), gained international recognition. Her efforts contributed to the 1991 independent review by the World Bank, and the NBA took the issue to the Supreme Court in 1994 (Mahurkar, 1991). Additionally, the NBA played a significant role in halting other dam constructions, such as the Upper Veda and Lower Goin Dams in 1997, and the fight against the Maheshwar Dam (in Madhya Pradesh).

Patkar has also been recognised globally for her work, receiving awards such as the 1988 United Nations Human Rights Prize, the 1990 Templeton Prize, and the 1999 Gandhi Peace Prize. Her contributions to environmental and human rights advocacy have earned her admiration

both in India and internationally. Although she joined politics briefly with the Aam Aadmi Party, she resigned after an unsuccessful bid in the Lok Sabha elections, remaining committed to social activism. The NBA's slogans, such as "Vikas Chahiye, Vinash Nahi" (We need development, not destruction) and "Koi Nahi Hatega, Bandh Nahi Banega" (No one will move, the dam will not be built), have become symbols of the struggle for justice. A research paper by Swaminathan S. Anklesaria Aiyar and Neeraj Kaushal (2018) contends that the fear of resettlement has been exaggerated. Their study suggests that those displaced by the Sardar Sarovar Dam are better off than their neighbours who refused to relocate, citing improved facilities such as schools, hospitals, and access to markets. However, critics argue that this narrative overlooks the significant challenges faced by many, including loss of agricultural livelihoods, ecological damage, and inadequate rehabilitation (Sikka, 2020).

The NBA's advocacy has garnered support from several celebrities, including Aamir Khan, Arundhati Roy, and Ali Kazmi, who made the documentary *Narmada: A Valley Rises* (1994). Another documentary, *A Narmada Diary* (directed by Anand Patwardhan), won the Filmfare Award for Best Documentary in 1996, highlighting the NBA's fight for social and environmental justice. The 2002 documentary *Drowned Out* by Spanner Films tells the story of a family that chose to stay in their home and drown rather than leave their land for the dam (Baviskar, 2004). The government of Gujarat promotes the Sardar Sarovar Dam as a "lifeline of Gujarat," claiming it will provide irrigation for 1.8 million hectares of land and drinking water to 4720 villages and 131 towns in Gujarat. However, the project has caused widespread flooding, submerging agricultural land and forest areas, leading to habitat loss, salinisation, deforestation, and the silting of the riverbed, all of which have negatively affected local fishing communities (De Lange & Ruijgrok, 2008; Parasuraman, 1999; Bhatt et al., 2021).

The displacement associated with the Sardar Sarovar Dam project is most severe in Madhya Pradesh, where 193 villages have been submerged, leaving over 100,000 people homeless (Sikka, 2020). The protests began in the Nimand region of Madhya Pradesh in 1977, drawing the attention of activists like Medha Patkar. The NBA's efforts have won praise for their nonviolent approach, and the movement was awarded the Right to Livelihood Award in 1991 (Mahurkar, 1991). Despite these efforts, critics maintain that the dam has caused irreparable harm to the region's flora and fauna. Over 7000 hectares of land became submerged, and villagers lost all their standing crops due to the flooding (Sikka, 2020). In 2020, tribal leader Chhotu Vasava, a member of the Bhartiya Tribal Party from Jharkhand, petitioned the Prime Minister of

India, urging the halt of land acquisitions for the Statue of Unity project, asserting that tribals were not receiving the promised benefits from the dam (Nayak et al., 2019). In 2019, activist Shabnam Hashmi reported the complete submergence of villages in Madhya Pradesh, including Chikhaldia, home to Asia's first fish farmer (Hashmi, 2019).

According to the Delhi Solidarity Group (2020), the total submerged land in Madhya Pradesh was 20,822 hectares, while in Maharashtra, 9590 hectares, and in Gujarat, 7112 hectares were affected. Additionally, substantial forest areas in Maharashtra, Gujarat, and Madhya Pradesh were also submerged, further exacerbating the environmental consequences of the dam (Kavish, 2020). Thus, while the Sardar Sarovar Dam may bring certain benefits to Gujarat, it has resulted in far-reaching ecological damage, the displacement of indigenous communities, and a growing movement demanding accountability, environmental justice, and fair compensation.

Multi-Dimensional Impact of Large Dams on Society and Nature

The impact of big dams can be very adverse because it negatively impacts the chemical, biological, and physical properties of rivers. The dam wall blocks migrations of the fish and traps sediments, which are very important for maintaining physical processes as well as downstream habitats. The artificial lake is not suitable for aquatic life, which takes time to evolve within a given river system. It also leads to salinisation and the destruction of plants and fish. Waterlogging is another significant negative impact that renders the land unusable. Salinisation also leads to a decrease in the quantity of drinking water. A critique of the Narmada Valley Project in 1988 by Kalpavriksh argued that the compulsory, compensatory afforestation by the authorities cannot compensate for the lakhs of deciduous trees that were cut, which had taken decades to grow (Kalpavriksh, 1988). A study, 'Uprooting Forests, Planting Trees: Success of compensatory afforestation: Measures Mitigating the Deforestation for the Sardar Sarovar Dam, India,' by Dipti Bhatnagar, rues the fact that the compulsory afforestation is being executed at a place far from the original forest region, which was being submerged (Bhatnagar, 2004). The Morse Committee Report in 1992 declared such a plantation futile. It also said that the people affected had not been consulted. The forests are being planted in different ecological zones (IELRC, 1992).

The Case Study of Tehri Dam

Tehri Dam in Uttarakhand is a multi-purpose dam. It

is situated in the Tehri Garhwal District in Uttarakhand and is the tallest dam in India. It is another mega project, which has led to the displacement of many people and played havoc with the local ecosystem. Its official name is the Tehri Hydro Power Project (THPP). Its height is about 855 feet, and it has a length of 1886 feet. The Koteshwar Dam downstream creates a low reservoir for the dam's pumped storage plant (THDCIL, 2024). While the government records show that 5091 families were displaced from Old Tehri and resettled in New Tehri, fresh data from 2001 has shown that 10303 families were displaced. A working group for the environmental appraisal of Tehri Dam, which was established in 1979, put the figure of displaced people at 85,600. It was under the Ministry of India's first Prime Minister, Pandit Nehru, that a preliminary investigation of the dam was completed in 1961, following which the design was completed in 1972 (UK Essays, 2021).

The Multipurpose dam was initiated in the Tehri Garhwal District in 1962, its approval was obtained in 1972, and construction started in 1977-78 after studying all the perspectives. However, the construction got delayed because of financial constraints as well as a lack of clarity on social and environmental impact. It is planned to provide water for generating electricity, irrigation, and municipal water supply. In 1986, the erstwhile USSR provided its technical and financial assistance, but because of political instability in the USSR, the project ended in the hands of the Indian government. The project was initially given to Uttar Pradesh's Irrigation Department, but in 1988, the Tehri Hydro Development Corporation was established to manage the dam. The centre had to fund 75% of the project, while the state government had to pitch in 25% (Sundaram et al., 2023).

The first phase of the dam was completed in 2006. Around 40 villages were displaced for its construction. The people who have been evicted allege that they have not got land rights, nor do they have basic amenities like clean drinking water, health care, or transport. Another grievance of the people is that they do not have the ownership rights of the land given to them, because of which they are not able to get any loan from any bank. Besides the lack of drinking water, there is no water for irrigation (Adhikar, 2009). Another study says that a total of 125 villages were affected, out of which 37 villages were fully affected and 88 villages were partially affected (Barthwal & Mohi-ud-din, 2017). This project is a joint venture of the Government of India and the State government of Uttarakhand. It is the largest dam in India, located on the Bhagirathi River in Uttarakhand. It is also the highest dam in Asia. It has the capacity to offset (one form of minimising the potential impacts of dams) 150 years of sedimentation, which takes its sediment

trap efficiency to 95%. It has a reservoir that generates approximately 1000 MW of hydroelectricity. It helps in distributing power to the states of Uttarakhand, Punjab, Haryana, Rajasthan, Uttar Pradesh, Jammu & Kashmir, Himachal Pradesh, and Chandigarh (Sharma, 2024).

Tehri Dam Protest: A Struggle for Livelihoods, Ecology, and Human Rights

The Tehri Dam project, which began in the 1980s and continued until 2004, has sparked extensive protests, particularly from environmentalists. Sundarlal Bahuguna, a prominent environmentalist and leader of the Chipko movement, strongly opposed the project, believing it represented a Western-driven ideology that viewed nature as a commodity. Bahuguna advocated for development rooted in India's culture and harmony with nature, arguing that India should prioritise peace and balanced growth over profit and affluence. He coined the slogan "Ecology is the permanent economy" and was supported by his wife, Vimala Bahuguna, who proposed the idea of the Chipko Movement. This movement, dedicated to conserving and ecologically using India's natural resources, earned the 'Right to Livelihood Award' in 1987. Bahuguna's consistent protests, including several hunger strikes and a 45-day fast in 1995, led to the formation of a review committee to assess the dam's ecological impacts. Despite these efforts, construction resumed in 2001, and the dam reservoir began filling up in 2004 (Swarup, 2007).

Bahuguna's fight for environmental preservation inspired similar movements, such as the Apikko Movement in Karnataka, led by Pandurang Hegde. This movement, aimed at halting deforestation in the Western Ghats, was influenced by Bahuguna's opposition to the proposed Bedthi hydroelectric project. Thanks to their combined efforts, a moratorium on green felling was imposed in 1989, safeguarding this ecologically sensitive region (PIL, 2024). Bahuguna was later awarded the Padma Vibhushan in 2009 for his environmental conservation work, having previously rejected the Padma Shri in 1981, as the government refused to cancel the Tehri Dam project (Sharma, 2009).

Along with environmentalists, many displaced people from the dam site also participated in the protests. Fishermen and others who depended on the river voiced their concerns, as many were denied government support or struggled with bureaucratic hurdles in accessing resettlement services. Displaced families, once thriving on fertile land, were forced to purchase goods they once grew. Promises of subsidised electricity and water were forgotten, and the displaced residents faced repeated relocation as the government proposed expanding the

nearby Jolly Grant Airport in Dehradun. The anti-Tehri Dam movement, spearheaded by Virendra Dutt Saklani, persisted for decades due to the dam's potential to disrupt the fragile ecosystem, displace communities, and damage biodiversity in the catchment area (Newton, 2008).

Environmentalists have long expressed concerns about the Tehri Dam's potential ecological impacts. The dam is in the Central Himalayan Seismic Gap, a major geological fault zone, raising fears that an earthquake could lead to the destruction of the dam and catastrophic flooding of nearby towns. Additionally, the dam could alter water chemistry, affect aquatic life and disrupt the seasonal cycles of fish that depend on annual floods. Flooding is crucial for depositing nutrients downstream and providing shallow waters that protect young fish from predators. However, the construction of the dam would block sediment flow and disrupt these vital ecological functions (Mohan & Ramacharla, 2013).

Opponents also argue that the Tehri Dam could exacerbate biodiversity loss, with the submergence of fertile agricultural land and increased landslides around the reservoir. The decomposition of submerged vegetation would contribute to the release of greenhouse gases, while the altered water chemistry could harm aquatic species. Experts maintain that the dam is designed to withstand earthquakes of up to 8.4 magnitude, though some argue that earthquakes in the region frequently exceed this threshold, increasing the risk of catastrophic failure. Moreover, the dam's reservoir could disrupt the movement of fish species, particularly those that migrate for breeding (Mohan & Ramacharla, 2013).

The construction of the dam has led to significant environmental and social concerns. Approximately 4193.813 hectares of forest land were diverted for the project, and excessive sedimentation in the reservoir could lead to waterlogging, salinity, and the loss of aquatic life. Furthermore, the dam's operation has altered the temperature dynamics of the river, affecting invertebrates and other aquatic species dependent on stable thermal conditions. If the reservoir and its canals are poorly maintained, waterlogging could hinder agricultural productivity, undermining the anticipated benefits of irrigation projects (Sharma, 2024).

The environmental and social implications of the Tehri Dam are profound, affecting both the local ecosystem and the displaced communities. The loss of biodiversity, changes in water chemistry, and risks of seismic instability continue to fuel debates about the long-term sustainability of the project. It also highlights the positive environmental and economic aspects of a reservoir project, such as attracting migratory birds, enhancing tourism, and maintaining water quality within safe limits. It also plans for a green belt to control soil

erosion and improve aesthetics. Malaria prevention efforts are being undertaken by health authorities, and pollution is managed through regular water sprinkling. The government claims that the project will create better employment opportunities for displaced people, offer improved housing, increase tourism, and provide access to education and healthcare. Various training programs have been initiated to support income-generating activities like floriculture, pisciculture, and handicrafts. However, critics argue that there is a disconnect between the promises made and their practical implementation, referencing the words of Sundar Lal Bhaguna and VD Saklani, who describe the Tehri Dam project as resulting in atrocities, displacement, corruption, and genocide.

Conclusion

The Narmada Bachao Andolan and Tehri Dam conflict highlights the environmental and human costs of large-scale infrastructure projects in India. While these projects promise development, they also lead to extensive displacement and social injustices. Displaced communities, particularly tribal populations, face severe hardships, including inadequate land, poor living conditions, and a loss of common resources. The affected communities, including indigenous tribes, farmers, and environmental activists, have fought tirelessly to protect their rights and preserve the ecological balance. The movements led by figures like Medha Patkar, Baba Amte, and Sundar Lal Bahuguna emphasise the necessity of obtaining informed consent from affected communities and ensuring their protection during development projects. These cases serve as a powerful reminder of the need for more responsible and inclusive policies in infrastructure planning.

References

- Adhikari, B. R. (2010). Tehri Dam: An Engineering Marvel. *Hydro Nepal: Journal of Water, Energy and Environment*, 5, 26–30.
- Aiyar, S. S. A., & Kaushal, N. (2018). Are resettled outsees from the Sardar Sarovar Dam project better off today than their former neighbours who were not ousted? (Working Paper No. 24423). National Bureau of Economic Research. <https://doi.org/10.3386/w24423>
- Amte, B. (1989). *Cry, the beloved Narmada*. Maharogi Sewa Samiti, Chandrapur, Maharashtra. Retrieved 28 June 2025, from <http://www.unipune.ac.in/snc/cssh/humanrights/10%20STATE%20ENVIRONMENT%20%20SCIENCE%20AND%20TECHNOLOGY/A%20dams%20and%20displacements/06.pdf>
- Barthwal, S., & MohiUdDin, M. (2017). Impact of development-induced displacement on the elderly due to the Tehri Dam construction. *Asian Journal of Research in Social Sciences and Humanities*, 7(8), 261–267.
- Baviskar, A. (2004). *In the belly of the river: Tribal conflicts over development in the Narmada Valley*. Oxford University Press.
- Bhatnagar, S. (2004). The Sardar Sarovar Project: An environmental and social impact assessment. Retrieved November 10, 2024, from <https://nature.berkeley.edu/classes/es196/projects/2004final/Bhatnagar.pdf>
- Botanical Survey of India. (1995). Plant diversity in the Tehri Dam. Retrieved November 4, 2024, from https://bsi.gov.in/uploads/documents/Public_Information/publication/books/miscellaneous/Plant%20Diversity%20in%20the%20Tehri%20Dam
- Bhatt, M., Mankad, A., & Maitreya, B. (2021). A review of major dam projects and their environmental impact assessment study of Gujarat State, India. *International Journal of Science and Research (IJSR)*, 10(6), 701–704.
- Chakravartty, A. (2020). The NGT committee renders the entire Baghjan oil field illegal. Down to Earth. Retrieved November 8, 2024, from <https://www.downtoearth.org.in/environment/ngt-committee-renders-entire-baghjan-oil-field-illegal-74077>
- Convention on Biological Diversity (CBD). (2010). What is impact assessment? Retrieved November 10, 2024, from <https://www.cbd.int/impact/whatis.shtml>
- De Lange, R., & Ruijgrok, W. (2008). The Sardar Sarovar Project and its impact on local communities: A critical review. Erasmus University Rotterdam. Retrieved November 8, 2024, from <https://repub.eur.nl/pub/18854/wp161.pdf>
- Department of Water Resources, Ministry of Jal Shakti. (2024). Narmada Water Disputes Tribunal, October 1969. Government of India, Retrieved November 9, 2024, from <https://jalshakti-dowr.gov.in/narmada-water-disputes-tribunal-october-1969/>
- Fernandes, W. (2001). Development-induced displacement and sustainable development. *Social Change*, 31(1-2), 87-103.
- Government of Uttar Pradesh. (2020). *The Uttar Pradesh Revenue Code (Amendment) Bill, 2020* (Bill No. 86 of 2020). PRS Legislative Research. https://prsindia.org/files/bills_acts/bills_states/uttar-pradesh/2020/Bill86of2020UP.pdf
- Hashmi, S. (2019). *A report based on a visit to areas in MP affected by the Sardar Sarovar Dam*. Anhad. Retrieved 3 July 2025 from <https://counterviewfiles.wordpress.com/wp-content/uploads/2020/02/narmada-report.pdf>
- Kalpavriksh. (1988). *The Narmada Valley Project: A critique*. Retrieved 29 June 2025 from <https://kalpavriksh.org/wp-content/uploads/2022/07/Narmada-Valley-Project-A-critique-Kalpavriksh-1988.pdf>
- Karnataka Legislative Assembly. (2020). *The Karnataka Land Reforms (Second Amendment) Bill, 2020* (LA Bill No. 42 of 2020). Bengaluru: Vikasa Soudha. Retrieved 3 July 2025 from https://prsindia.org/files/bills_acts/bills_states/karnataka/2020/Bill%2042%20of%202020%20Karnataka.pdf
- Kavish, P. (2020, July 6). The environmental impact of the Sardar Sarovar Dam. *Sabrang India*. Retrieved November 10, 2024, from <https://sabrangindia.in/environmental-impact-sardar-sarovar-dam/#:~:text=A%20fact%2Dfinding%20report%20by,Impact%20of%20large%20dams>

- Khan, M. A. (2024, July 12). The dark earth: How unchecked mining is uprooting lives in Jharkhand. *Outlook India*. Retrieved 28 June 2025, from <https://www.outlookindia.com/national/the-dark-earth-how-unchecked-mining-is-uprooting-lives-in-jharkhand>
- Kissu, S. (2020, April 29). Odisha: 32 tribal families in Kalahandi were rendered homeless by the Forest Department amid lockdown. *NewsClick*. Retrieved June 28, 2025, from <https://www.newsclick.in/Odisha-32-Tribal-Families-Kalahandi-Rendered-Homeless-Forest-Department-Lockdown>
- Land Conflict Watch (LCW). (2022). Sixty-nine houses were demolished in the Waithou Protected Reserve Forest area in Manipur. Retrieved November 8, 2024, from <https://www.landconflictwatch.org/conflicts/sixty-nine-houses-demolished-in-waithou-protected-reserve-forest-area-in-manipur>
- Lin, Q. (2011). Influence of dams on the river ecosystem and its countermeasures. *Journal of Water Resource and Protection*, 3(1), 60–66.
- Mahurkar, U. (1991). Narmada Bachao Andolan crusader Medha Patkar gains recognition at last. *India Today*. Retrieved November 10, 2024, from <https://www.indiatoday.in/magazine/states/story/19911215-narmada-bachao-andolan-crusader-medha-patkar-gains-recognition-at-last-815239-1991-12-14>
- Mohan, K. J., & Ramancharla, P. K. (2013). Earthquakes and dams in India: An overview. *International Journal of Civil Engineering and Technology*, 4(6), 101–115.
- Morse, B., & Berger, T. R. (1992). *Sardar Sarovar: Report of the independent review*. Resource Futures International. International Environmental Law Research Centre (IELRC). Retrieved 3 July 2025 from <https://ielrc.org/Content/c9202.pdf>
- Nayak, B. P., Kohli, P., & Sharma, J. V. (2019). *Livelihood of local communities and forest degradation in India: Issues for REDD+*. Ministry of Environment, Forest and Climate Change, Government of India. Retrieved July 5, 2025, from <https://moef.gov.in/uploads/2019/06/redd-bk3.pdf>
- Newton, J. (2008). Displacement and development: The paradoxes of India's Tehri Dam. *The Geographical Bulletin*, 49(1), Article 2. Retrieved 4 July 2025 from <https://digitalcommons.kennesaw.edu/thegeographicalbulletin/vol49/iss1/2>
- Parasuraman, S. (1999). *The development dilemma: Displacement in India*. Palgrave Macmillan.
- Parthasarathy, R., & Dholakia, R. H. (Eds.). (2011). *Sardar Sarovar Project on the River Narmada: History of Rehabilitation and Implementation*. Concept Publishing Company.
- Press Institute of India (PII). (2024). The struggle to save forests: Karnataka's Appiko movement, an offshoot of Chipko, continues to inspire. *Press Institute of India*. Retrieved June 29, 2025, from <https://pressinstitute.in/grassroots/the-struggle-to-save-forests-karnatakas-appiko-movement-an-offshoot-of-chipko-continues-to-inspire/>
- Raja, A. (2020). *Explained: Why is trouble brewing around the Statue of Unity in Gujarat?* The Indian Express. Retrieved June 29, 2025, from <https://indianexpress.com/article/explained/statue-of-unity-gujarat-kevadia-village-land-acquisition-ssnnl-6487778/>
- Sardar Sarovar Narmada Nigam Limited (SSNNL). (2017). Sardar Sarovar project. Sardar Sarovar Narmada Nigam Limited. Retrieved 29 June 2025 from <https://cgpit-bardoli.edu.in/wp-content/uploads/2018/08/SARDAR-SAROVAR-2017.pdf>
- Sardar Sarovar Narmada Nigam Limited (SSNNL). (2024). Canal Network. Sardar Sarovar Dam. Retrieved November 7, 2024, from <https://sardarsarovardam.org/canal-network.aspx>
- Sharma, M. (2009, February 21). Passages from nature to nationalism: Sunderlal Bahuguna and Tehri dam opposition in Garhwal. *Economic & Political Weekly*, 44(8), 56–62.
- Sharma, S. C. (2024). Rehabilitation of Tehri Dam and lessons learned. *Tehri Hydro Development Corporation India Ltd.* Retrieved November 10, 2024, from https://www.iitr.ac.in/wfw/web_ua_water_for_welfare/case_studies/tehri/article_on_REHABILITATION_OF_TEHRI_DAM.doc
- Sikka, G. (2020). Moving beyond economic analysis: Assessing the socio-cultural impacts of displacement and resettlement by Sardar Sarovar Project, India. *Geography, Environment, Sustainability*, 13(3), 90–101.
- Sundaram, D., Sharma, S., Mathur, R., Kashyap, K., & Verma, K. (2023). A case study of the background, aspects, and impacts of the Tehri Dam on the economy, ecology & population of India. *International Journal of Innovation and Multidisciplinary Research*, 3(1), 75–84. Retrieved June 29, 2025, from <https://ijiamr.cmrie.org/docs/a-case-study-of-the-background-aspects-and-impacts-of-the-tehri-dam-on-the-economy-ecology-and-population-of-india-APCOZZEKAXGE.pdf>
- Swarajya. (2020). Quick political developments in Gujarat's Bharuch: BJP MP Mansukh Vasava resigns over tribal issues, AIMIM reacts. *Swarajya*. Retrieved November 10, 2024, from <https://swarajyamag.com/news-brief/quick-political-developments-in-gujarats-bharuch-bjp-mp-mansukh-vasava-resigns-over-tribal-issues-aimim>
- Swarup, H. (2007, July 8). Bahuguna, the sentinel of the Himalayas. *The Tribune*. Retrieved 29 June 2025 from <https://www.tribuneindia.com/2007/20070708/edit.htm#6>
- Tehri Hydro Development Corporation India Limited (THDCIL). (2024). Tehri Dam & HPP Stage-I. Retrieved November 10, 2024, from <https://thdc.co.in/index.php/projects/hydro/tehri-dam-HPP-stage-I>
- Thakkar, H. (2010). Displacement and development: The construction of the Sardar Dam. *Cultural Survival*. Retrieved November 10, 2024, from <https://www.culturalsurvival.org/publications/cultural-survival-quarterly/displacement-and-development-construction-sardar-dam>
- UK Essays. (2021). Tehri dam: Development and displacement. Retrieved November 10, 2024, from <https://www.ukessays.com/essays/society/tehri-dam-development-displacement-6178.php>
- World Bank. (1992). Event: Sardar Sarovar Project, India. The World Bank. Retrieved November 10, 2024, from <https://timeline.worldbank.org/en/timeline/eventdetail/1911>