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Choosing between energy and ecologies of health: Understanding developmentalism, state formation and local life worlds

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Abstract

Environmental crises, precipitated by a globally dominant model of developmentalism, have changed the lives of less visible communities in geographical peripheries. This study draws on our participant observation of the China–Pakistan Economic Corridor (CPEC) in general as a massive infrastructural development project and the Qadirabad coal power plant as one of many CPEC projects where developmentalism and local lives intersect with each other. We have presented evidence of how massive development projects bring about consequential but disguised social and environmental impacts on locals. The locals' narratives show that the Qadirabad project has brought about economic, agricultural and environmental degradation in their lives. They believe that the governments in Pakistan are conscious of foreign projects with adverse effects on the everyday lived realities of the people but willfully choose to ignore them.

KEYWORDS
coal energy, CPEC, developmentalism, health ecologies

1 | INTRODUCTION

The energy crisis Pakistan faced after 2007 affected its economy, services, welfare and revenue. Throughout the chaotic period of energy emergency (2007–2014), domestic and industrial electricity consumers faced complete helplessness. This chaotic situation produced a new logic of developmentalism (based on a questionable modernist economic logic), where meeting the energy requirements overshadowed environmental, ecological and social

concerns. The development projects, such as Sahiwal coal power plant, aimed at boosting the country's social and economic sectors proved detrimental to locals' lifestyle and their environment.

In Qadirabad (Sahiwal District, Punjab, Pakistan), the sudden growth of coal as an energy source changed the daily lives of people living near the coal power plant. The feasibility studies, employing what McCloskey (1998) calls modernist methodology, hurriedly conducted before the construction of the power plant began, mainly focused on economic logic. The state officials did not explore aspects beyond traditional cost-effectiveness; thus, the project started without significant resistance from local stakeholders. However, its impact on the local environment and population soon became evident. The tales from villages surrounding Qadirabad highlight how governments when compelled to fast-track economic gains damage the natural environment and resources of the locals—people who are supposed beneficiaries of development projects.

Over time, energy has become one of the most important needs of humanity. According to International Energy Agency (IEA), the global energy consumption has more than doubled from 1973 to 2018 (IEA, 2022). In the following sections, we have tried to locate the projected growth of energy use in the context of how international development agencies and states envision economic growth for improving livelihoods and how certain energy sources, that is, the coal industry, cause environmental degradation. We see coal pollution as a long-term, devastating source of environmental degradation that negatively affects water quality, pollutes local air, changes in rainfall patterns, depletes natural resources, and damages cultivable land (Mishra & Das, 2017). Ramsay (2011) and Williams (2011) describe several negative effects of burning coal for energy production, while Hota and Behera (2016) explain how coal power plants (producing electricity) affect nearby areas and cause severe health issues. North et al. (2016) highlight the impact of coal pollution on rivers, air, lands and canal.

Scholars have also shown interest in generating discussions on politics, environment and neoliberal economic logic (Rao, 2018). Oliver (2019) has studied the relationship between material rationality (utilitarian environmentalism) and politics. Such a relationship, among the above factors, translates into intersectionality where political exigencies determine the state's focus on economic development to increase gross national product (GNP). State officials use rural people's agricultural lands for energy projects, such as coal plants, which damage their natural resources (Nielsen & Oskarsson, 2016). As the above studies show, long-term, continuous coal burning damages environment by polluting soil, air and water bodies in nearby areas. Coal plants' disposal, such as water, that cools down coal in the plant causes water and land pollution. Harmful materials that come from coal burning contaminate underground soil.

The release of chemical particles in wastewater contributes to water pollution. Metallic materials—copper, iron, manganese, nickel, etc.—make water unusable for domestic use in nearby areas. They cause multiple health threats, including voice and hearing disorders, rheumatism, euphoria, high blood pressure, impotence, diabetes, high cholesterol, cancer and kidney stones (Garg et al., 2022). In addition, excessive use of water to cool down coal also causes water scarcity for agriculture and domestic use. Putting together all these visible and invisible hazards, the use of coal for energy production causes leaves serious concerns at both empirical and theoretical levels. However, it also intrigues ethnographers to study the relationship between electricity, its production, use and impact on communities and everyday life spheres (Abram et al., 2019; Gupta, 2015; Winther & Wilhite, 2015).

We find the debate about coal as an energy source a representative of neoliberal forces working within the environment against those who live in it. In the case of Pakistan, the marginalization of environmental concerns in general and the people-centric approach in particular are evident from the media landscape where one hardly finds any critical evaluation of CPEC for its role as new ecology of environmental degradation (Qusien & Robbins, 2022). Therefore, our study examines the role of coal as a source of energy in Pakistan. It brings forward ethnographic evidence from the Qadirabad power plant—presenting the case from a Pakistani village with far-reaching national and global concerns.

2 | THEORETICAL CONSIDERATIONS

Escobar's (2011) *Encountering Development* describes the importance of economists in the development discourse and shows that food economization leads to ambitious goals and increasing hunger. He explains how peasants, women and nature become objects of knowledge and targets of power under the 'gaze of experts' to represent the formation of knowledge and power. In another study, Escobar (1988) describes the role of discursive manifestations of development and how environmental concerns are framed in the language of environmental viability. To him, the production of new discourses in development is not a single project because it brings about resistance from the other side such as locals, feminists, environmentalists and peasants. The impact of resistance is reflected in new practices of knowledge and vision, even if different forms of resistance occur within the modes of development discourse (Escobar, 1988, 1992 & 1995). In this study, we have tried to operationalize the role of similar developmental logic in the context of local forms of resistance if it exists.

The operationalization explains how 'developmental logic is at work in the operation of power plant' in Qadirabad without considering environmental concerns. The theoretical concerns of resistance against development are visible at the community level when the state imposes development discourses on locals at the cost of their health in their natural environment. This is quite visible from the link between overall capitalist governance and climatic changes at global level (Baer, 2012). Thus, locals' reaction against the development discourse is natural because they do not want their local environment spoiled, impacting their health for the sake of state-led policies that remain alien to the logic and needs of the local community.

Escobar (1988) explains that the development discourse brings ecological manipulations and changes in locals' lives (Escobar, 2011). He considers development agencies and state responsible for managing the human use of planet Earth. He argues that it is the responsibility of institutions and state representatives to move people and nations towards sustainability by changing institutional structures and values. His insights help us explain how international development discourse in the form of the coal power plant in Qadirabad is a new form of manipulation, affecting the locals' environment and their health. (The state knows that the construction of such plants affects human health, environment and nearby lands with a lasting impact on local lives.) Our case study shows that developmentalism is mostly carried out on basis of the relationship between center and peripheral lives.

Development experts have long been interested in the idea that underdeveloped nations can smoothly move along the path of progress through planning. Perhaps no other concept has been so insidious; no different view has gone so unchallenged as modern planning (Escobar, 1992). In the case of Qadirabad, it is important to understand how management and planning represent social change, engineered by Pakistani state institutions with aid from international development agencies. The residents of Qadirabad are closely associated with their land through kinship, economies, ceremonies, folk language and spiritual traditions complementing each other as a collective social process of cohabitation. The construction of power plant not only caused environmental issues for them but also affected their social and economic life. The power plant was established under a development programme that might benefit the state and its institutions and bureaucracy but ignored locals' ecology, lands and health.

Ecosystems experts argue that hazardous developmental activities displace the poor from their inherited place (alongside other displacements in the local community) and change their location, status and occupations (Millennium Ecosystem Assessment, 2003). In the 1970s, environmentalists and ecologists referred to uncontrolled industrialization and economic growth as the primary problem. In the following decade, development practices around the globe affected low-income families. Capitalism–development duo affected peasants, local areas and local environment. The capitalization of nature was meditated by the state that served as an interface between capital and nature and human beings and space (Escobar, 2011).

Escobar's theoretical considerations help us link the state of Pakistan with the logic of developmentalism as a supra-state logic rooted in the contemporary neoliberal order. This study counters the convenient assumption of presenting energy produced from coal as a necessary condition to bring prosperity. We argue that the Qadirabad coal power plant presents a different picture where the nexus between hazardous environment and development has a

huge toll on locals' health. The reason for choosing such areas as sites of environment unfriendly projects is also grounded in the state's capacity to make certain regions and their populations invisible.

3 | LOCALE PROFILE

This study grew out of a year of fieldwork in the form of participant observation, unstructured interviewing and community mapping in Qadirabad and adjoining villages. Sahiwal coal power plant, located in Qadirabad, is a part of CPEC that is the flagship project of Belt and Road Initiative (BRI). Qadirabad is a village (20 km off Sahiwal City) with a population of approximately 5000 residents. It is a small area (locally called a *chak*) that is famous for its agricultural production. It has large-scale farming lands that are irrigated with canal water from Lower Bari Doab Canal (LBDC). The LBDC is the second largest source of irrigation in the Pakistani Punjab: According to irrigation officials, it passed through the centre of agricultural lands and irrigated almost 300 000 acres. However, after the construction of the power plant, agricultural lands on one side of the canal have been dedicated to the plant, while the other [agricultural] side is also not in use. No one uses LBDC water for irrigation because the power plant uses LBDC water to cool coal. Thus, the power plant has considerably affected locals' choices and limited their income because their fertile lands do not produce grain and cotton anymore.

As for Sahiwal, the city was founded in 1865 when British officials built a train station at a small village on the Karachi–Lahore railway line. The site was named Montgomery after Sir Robert Montgomery, the lieutenant governor of Punjab, and it replaced Gogera as the capital of the newly created Montgomery district.[1] In 1867, Sahiwal became a municipality, and the construction of LBDC began in 1914.[2] During the partition of sub-continent India in 1947, Punjab Boundary Commission allocated the city, being part of the Montgomery District, to Pakistan. The commission rationalized the decision based on the Muslim majority in the area despite the claims of Indian National Congress and Sikh groups based on greater property ownership and revenues paid to the state (Baviskar, 2020). In November 2013, the China Western Power Company and the government of Punjab signed an agreement to set up two 660-MW coal plants in Qadirabad, Sahiwal. The development began in June 2015, and the first unit became operational in May 2017. The second unit became operational in 2017. Together, both units add 1320 MW of electricity to the national grid.

Figure 1 shows the location captured from Google Maps for a clear picture of Sahiwal coal power plant site. Figure 2 is a picture taken from the field by the first author to give a visual presentation of the plant amidst natural topography of the area, that is, green fields, plants and cultivate lands.

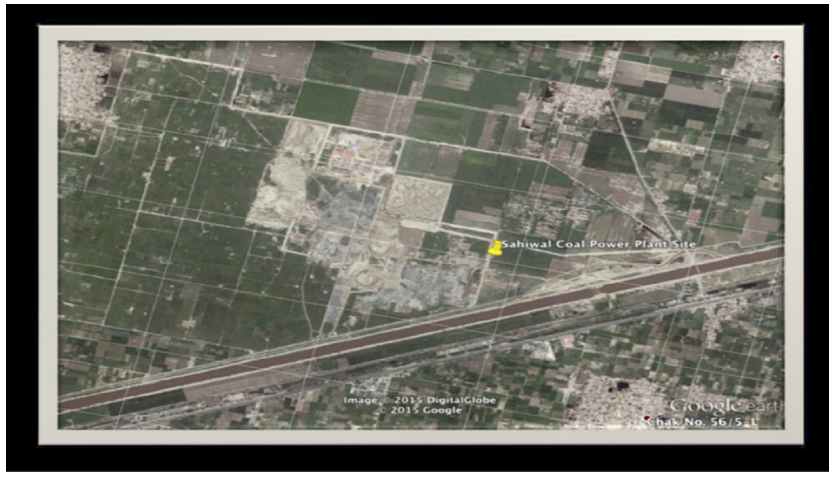


FIGURE 1 Sahiwal coal power plant map. *Source*[3]: Google Maps. [Colour figure can be viewed at wileyonlinelibrary.com]

FIGURE 2 Covered area of Sahiwal coal power plant. *Source*: Sahiwal Coal Plant Station Covered Area (Photography, August 2018) (this picture is captured by the researcher in field area). [Colour figure can be viewed at wileyonlinelibrary.com]

TABLE 1 Age background of respondents to questionnaire (total number of respondents is 60).

Age group	Respondents	Percentage
25–35	10	16.6%
35–45	13	21.6%
45–55	11	18.3%
55–65	18	30.0%
65–75	08	13.3%

Source: Field data in 2018–2019.

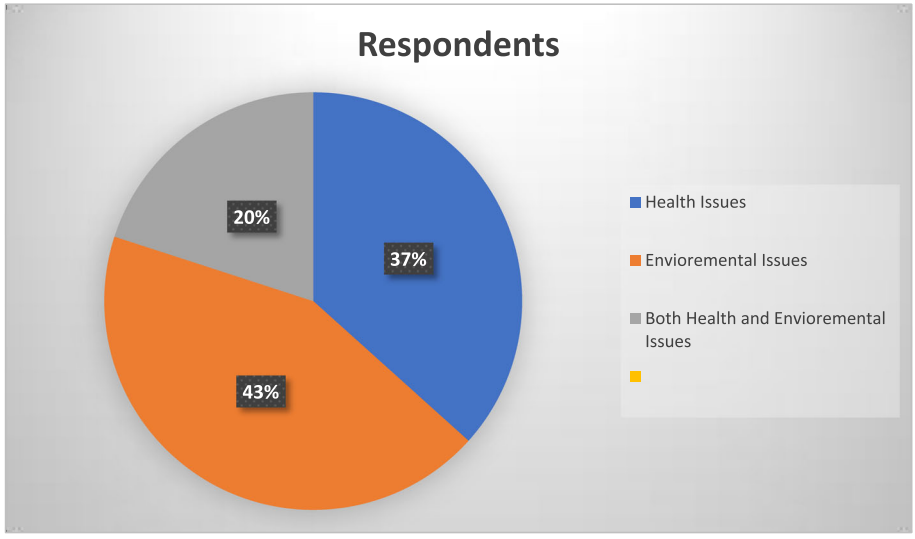
We interviewed about 60 residents, workers and labourers from diverse socio-economic backgrounds. We call our conversations interviews even if some of them were brief and informal to the extent that we walked along with some respondents, and our conversations with them focused on seeking their understanding of the power plant as a permanent feature of their surroundings. Most of the interviews were conducted in respondents' homes. Although all authors participated in the fieldwork, the first author was mainly responsible for interviewing females and carrying out fieldwork inside the houses. In addition to formal and informal discussions, we tried to bring in participant observation that sometimes we shared with locals and sometimes not by carrying on with them as part of their everyday routine. We decided on our choice of participant observation sites and selection of representative segments that is, social classes, gender and age groups, after a survey for community mapping. The following discussion of fieldwork is based on our participant observation, interviews and analyses from our questionnaires with a brief picture of responses.

Table 1 describes the age background of respondents. Of 60 respondents, 16.6% are in the range of 25–30 years, 21.6% in 35–45, 18.3% in 45–55, 30% in 55–65, and 13.3% in 65–75. Table 2 shows locals' perception of the impact of power plant on the relationship between the human population and their presence in ecological settings. It shows that 11.6% of the respondents think that the power plant has negative effects and 5% do not see any negative impact. Those who do not see any negative impact are from the age group of 25–35. Approximately 15%, mainly from the age group 35–45, think that the power plant negatively affects the community, and 6.6% believe that the power plant brings jobs, opportunities and new technology to the community. Approximately 16.6% of the

TABLE 2 People's perception of ecological and health effects.

Respondents in age group	NEHE	PEHE
	F____P	F_____P
25–35	7_____11.6%	3_____5.0%
35–45	9_____15.0%	4_____6.6%
45–55	10____16.6%	1_____1.6%
55–65	16____26.6%	0_____0.0%
65–75	08____13.3%	2_____3.3%

Abbreviations: F, frequency; NEHE, negative ecological and health effects; P, percentage; PEHE, positive ecological and health effects.
Source: Field data in 2018–2019.



GRAPH 1 Respondents think about development discourse. *Source*: Field data in 2018–2019 (the graph is made by the researchers; the data are collected in the fieldwork). [Colour figure can be viewed at wileyonlinelibrary.com]

respondents, mostly from the age group 45–55, consider the power plant harmful to ecological conditions, while 1.6% consider it harmless. One-fourth of the respondents (26.6%) emphasize ecological and health issues. Respondents from age groups 55–65 and 65–75 do not see any significant benefit of the power plants. Their responses also reflect the issues their age groups face. Many suffer from health issues such as asthma, eyes problem and lung issues and there is no chance of their employment in the power plant.

4 | GRAPH 1: DEVELOPMENT DISCOURSE AND RESIDENTS

We used a judgemental sampling design for surveys. We selected different households in Qadirabad where plant construction has had multiple effects on locals' social and economic life. Before the fieldwork, we went to the Office Deputy Commissioner (DC) of Sahiwal City to discuss the purpose of our study and to seek permission for working with local families living in Qadirabad and adjoining villages. In Qadirabad, we began by interviewing five residents who were in their 40s and were concerned about the long-term impact of the project. Finding males to converse

was not a challenge, but accessing female respondents was difficult. We asked females to identify other females in the village who could be willing participants with a female anthropologist. Our female respondents ranged in the 25–65 age bracket. Elderly females, particularly those who headed their households, were relatively more concerned and better informed about the impact of power plant on their decision-making and financial calculations. A female head (of a landowning family) told us that she faced difficulties in managing her household income after her daughter-in-law was diagnosed with breathing problems that she attributed to the power plant. Her opinion on the impact of power plant stemmed from her memory of the earlier days of her son's marriage when her daughter-in-law's asthmatic tendencies did not look serious.

5 | METHODOLOGICAL MEDITATIONS

After the selection of the field site, one of the locals became our key informant. We relied on the key informant to guide us about the exact location of all households and some of the relevant people whom we wanted to meet. We used purposive sampling in the village, that is, approaching the people who were more critical of the plant and its logic in their everyday parlance. We conducted interviews (semi-structured to completely unstructured conversations) with locals who agreed to share their experiences of pollution the power plant caused. Interviews were conducted in a friendly and often instant manner as dictated by the availability of people who agreed to share their thoughts with us whenever and wherever possible.

For questionnaires, we used an in-depth interview guide with a loose scope of interview themes written in English and Urdu, which we frequently had to translate into Punjabi. We conducted all interviews in a face-to-face conversation. The data were collected in a friendly environment, that is, participating with village residents in their normal day-to-day routine and attending their events of sorrows and happiness, that is, weddings, childbirth, funerals and post-funeral rituals. All respondents were informed about the purpose of the study, and they were assured of the confidentiality of their personal information and responses. Some respondents felt hesitant and did not allow the recording of their interviews because CPEC is both a political and security project in Pakistan. Nonetheless, the locals, who were cognizant of the presence of officials from secret agencies in the area, were forthcoming once they were convinced about the academic nature of our work.

Our study design was open for the local people to express themselves according to their understanding. Anthropology in general is believed to be open ended, comparative and 'generous because it pays attention, and responds, to what other people do and say' (Ingold, 2017, p. 22). Therefore, we understood that normally people drew a comparison of their lifestyles before and after the construction of the power plant. Our conversations with them varied: Some lasted for a few minutes, while most spanned hours covering diverse historical, political and socio-economic subjects. Virtually, all conversations were recorded and written in Urdu or English for thematic analysis. We conducted 12 focus group discussions (FGD) with no particular focus on age groups (our FGD mainly came from informal group discussions with people sitting together who gave us space and time to engage with them in a little formal way). Thus, our experiences in the field, participant observation and communication with locals helped us understand the power of development, which negatively affected human health and environment in the name of a 'game-changer project'.

6 | EVIDENCE IN THE LOCAL EYES

The government of Pakistan precipitated the construction of Sahiwal coal power plant under CPEC funding to cope with energy deficiency. But it did not consider the environmental issues the coal industry would bring about. Conversely, China's policy towards Pakistan was also interesting. Coal plants became a preferred choice to quick-fix Pakistan's energy crisis. The host government also emphasized the benefits of the facility and neglected the locals'

concerns. State institutions and officials compromised on health and environment to generate energy. Once the power plant became operational, it negatively affected the canal water, agricultural lands of the nearby areas and local ecological conditions, affecting the local economy and threatening the ecosystem.

7 | COAL BURNING, ENVIRONMENT AND EMBODIED EXPERIENCES

Although ecosystem experts have exposed the role played by activities of the poor, the main problem is rooted in development that displaces local communities and forcefully changes people's habits and occupations. Since the 1970s, environmentalists and ecologists have shared a belief that uncontrolled industrialization and economic growth were the underlying issues (Athanasiou, 1998). But it became evident in the 1980s that the development practices mainly affected low-income families. They affected peasants, local areas and the local environment (Bryceson, 2002).

Many anthropologists and environmentalists agree that coal is a polluting energy source that negatively affects climate (Singh, 1988). Coal power plants are environmentally more damaging than nuclear power plants. To produce the same amount of energy, coal power plants emit approximately 100 times more radiation into the surrounding environment. The most injurious impact is the emission of greenhouse gases, mainly carbon dioxide, though emission is not the only negative effect coal-burning causes. The emitted materials also damage the ecosystem of nearby areas. Coal transported through long-distance diesel trains emits additional carbon dioxide and other toxic particles, which pollute the air. Coal burning in power plants releases harmful particles, which may cause cancer and respiratory problems. They also affect the healthy development of children, reproduction and the immune and nervous systems.

Sahiwal coal power plant's environmental effects include damage to fertile agricultural land, canal water pollution and air pollution. The power plant also produces large quantities of hazardous waste every year, including fly ash, land ash and pipe-gas slopes. Before the power plant, Qadirabad residents used canal water for farming, and their local environment was comparatively clean. Although there are repeated themes of locals' memories about access to water, air quality and their overall healthy lifestyle, their sense of loss is visible in the current ethno-ecological landscape. Locals feel marginalized because the arrogant attitude of state authorities is so complicated and perplexing that they are unable to fully capture the mechanics of the system that plays the role of main polluter. The depiction of such a remorseful loss is evident from a respondent's narration that the 'power plant uses coal imported from South Africa because the authorities claim that Pakistani coal does not have the electricity-grade burning capacity. The imported coal first reaches Karachi and then a special train brings it to *Yousafwala* (a village near Qadirabad). Then it is loaded in trucks and sent to the power plant. Coal thus affects the local environment from Karachi to Sahiwal because the loadings of coal boxes are uncovered'.

Similarly, another local, Rehman, narrated the story of the construction of the power plant. Rehman lives in the area and worked on agricultural lands. He said, 'I am not aware of the scientific damages, but I know that environmental conditions are different from what I enjoyed before the power plant. I hung white cloth on a rope and it changed color (turned black) in a few hours because of ashes in the air. I do not understand how state and development agencies claim that they are producing clean and safe electricity from the Sahiwal coal power plant'. He added, acknowledging that he does not have much knowledge, that 'environmental protection agencies have banned coal energy plants. I want to ask the Pakistani state and officials why did they bring in the type of development that was banned in most parts of the world? They knew that coal power plant would harm people's health'. According to Rehman, the summer is now hotter in Sahiwal than ever before, and some people have allergy problems that they did not hear of in the past.

As we talk about a comparison of pre- and post-construction phases of power plant, which are mostly present in people's narration, Siddique pertinently narrates how his life is different now in the post-power plant life realities. He faces trouble while walking and struggles with his daily chores. In 2017, he learned that his liver had weakened

and his spleen had swollen. His doctors linked the above problems due to drinking contaminated water. Siddique blamed the power plant for contaminating his village's groundwater water. After diagnosis, he was no longer drinking tap water and instead obtained it from the Qadirabad water supply system. He shared that he had been recommended full bed rest along with drugs for 6 months. His agony persisted even after coming home as he had breathing issues and headaches. Siddique said that other villages' water had also been contaminated. His brother Umer Hayat also faced similar issues mainly due to consuming contaminated groundwater.

Nazir, another resident in his 60s, shared that the power plant had affected his maize yield. His farm was next to the power plant. The plant's floodlights switched on at night damaged his crops. (Security officials had mounted lights on the walls of power plant every few meters.) He added, 'The patches that come into direct contact with floodlights do not produce corn; it is a total loss for farmers in the village'. Abid Mehmood, General Director for Agriculture in Punjab, justified Nazir's comments because high beams raised heat. Floodlights had increased the area's temperature, thus preventing the occurrence of vegetative stage. Nazir also shared that his agricultural land was drying, and he believed that the reason was air pollution caused by the power plant. He estimated that air pollution dried 80% of his guava trees because the ash dumped in the plant spread to surrounding areas. Another respondent, Waheed, narrated that the release of dust from the power plant caused air pollution in adjoining areas, which affected locals and local environment. The plant released poisonous gases, ash and particles, which dispersed in the wind when coal burned.

However, the state officials downplayed the issues. They were not concerned, as of our fieldwork, about monitoring air pollution or covering coal during its transportation. An informant explained, 'all coal is transported by train, and the local [state] authorities have taken no protection measures'. After the state and international development agencies signed a memorandum of understanding (MOU) for the power plant, officials forced the concerned environmental organizations to approve the project. Once approved, the state allowed the power plant to generate electricity (and dust particles). No protective measures were taken, nor was any other arrangement made to collect spilled-over coal materials, which became a source of pollution.

Constant coal fire raised the atmospheric heat and polluted the local environment. It sucked moisture from the air, which is essential for human beings and the agriculture sector. Local officials were also aware that coal dust particles that arose from loading, unloading and transportation of coal were harmful, but they were either complacent or not interested in finding a permanent solution to control dust-related hazards and ensure sustainable development. Shafiq Butt, in his 2014 article in *Dawn*, expressed his concerns about the environmental impact of Sahiwal coal power plant. He also shared the thoughts of locals and an environmentalist, but the government did not heed and started the power plants in May 2017 (Butt, 2014).

The local narratives and prior studies show that the government tacitly accepted the environmental cost. A respondent told us that many trees were cut down to construct the power plant. No new plantation was initiated in the village. Trees, which were cut, yielded fruits for locals and kept the environment clean. State officials ignored the environmental impact and hardly followed ecological laws, thereby making the power plant a cause of environmental degradation. Many respondents opined that the plant uprooted their life. They remembered green fields surrounding their village and a clean, healthy environment. They remembered the times when they breathed fresh air. Expectedly, their younger generation was also concerned about the change it witnessed. A young respondent studying sociology was of the view that 'science has shown that coal intensifies climate change, leading to disastrous outcomes such as floods, cyclones, and sea intrusions. So why is the Pakistani government going for coal? Qadirabad residents have reported dangerous air quality, depletion and contamination of groundwater, and effects on agriculture. It is now the government's responsibility to examine and resolve environmental issues highlighted by local authorities over the past few years'.

Our structured interviews and conversations with village residents show that the power plant has significantly changed locals' relationship with their once 'natural environment'. From mining to processing to burning, every stage of coal lifecycle involves detrimental effects on local water sources. Coal plants use water because heating water produces steam that turns on electricity-generating turbines. Water comes from rivers, canals or lakes in the vicinity and then power plants directly pump, heat and discharge water from the water supply. The wastewater is much

warmer than the water supplied from the source (up to 20–25 F). It produces thermal pollution, which reduces fertility. One power plant drains and discharges between 70 and 180 billion gallons of water every year (Watzlaf & Ackman, 2006).

The residents of Qadirabad have shared that the groundwater level has dropped 15 ft in the last 3–4 years. This could have resulted from excessive water pumping for the power plant. (The Lower Bari Doab water is now used for energy generation, instead of irrigation.) They suspected that the plant also contaminated groundwater sources. Now people have stopped drinking tap water. They use water coming from the water supply scheme. Most of them now use tube well for irrigation of crops, but every peasant cannot afford its expenses. They claim that the power plant-related coal sludge and waste, injected in the nearby canal water, have made their lands unusable for agriculture. The canal that villagers earlier used to irrigate crops no more exists, as its water is now used for the plant. Some of them think that the diversion has also changed the taste of groundwater.

During an interview, an environmentalist Nabeel Khan Niazi, who works on the environmental impact of the coal power plants, explained that maximum groundwater abstraction for the Sahiwal power plant happened during the winter season (from January to March) when canal Bari doab water is not available. While working on arsenic dynamics in water, Niazi and his team investigated the rising arsenic level and the impact of groundwater abstraction in Sahiwal and all nearby villages. The team collected up to 220 water samples from hand pumps and electric pumps in the nearby villages. The results showed that water was 45% contaminated with arsenic concentration. As of our writing, this level of arsenic concentration is much higher than the World Health Organization's safe limit in drinking water (10 μg per litre). Other water quality parameters, including chloride, sulfate and sodium, were also higher (30%–40%). Niazi explained that the 'information collected from the survey was important. It indicated that there was a potential threat to groundwater quality and quantity in the vicinity of Sahiwal coal power plant'.

In a similar vein, a respondent, Rizwan, stated that Punjab's Environmental Protection Department (EPD) authorized all Sahiwal coal power plant agreements. He recommended the investigation of responsible officials and adequate address of unanticipated issues, including water depletion and other related challenges facing the local community. He believed that the mega-development project locked the locals into a self-indicated, long-term ecological and socio-economic challenge. The state and its bureaucracy could conduct a traditional environmental impact assessment and follow its recommendations. They did not consider either locals or their environment.

The participants (10) of our FGD were also familiar with the causes and consequences of air pollution and the state's policies. They wanted to see the power plant closed immediately to provide relief to locals. The state could involve environmental experts to examine all viable options and implement them because the excess of energy came at the cost of the local environment. They wanted a break 'before respiratory system failures or any other pandemic'. Participants of the other focus group considered Sahiwal coal power plant 'a small price', but they wanted PML-N projects corrected for the long-term survival of the country. The energy and power sectors required a significant course correction.

8 | COAL PLANT AND THE IMPACT ON HEALTH

One of the most damaging health dangers for the local community is air pollution emitted from the smokestacks of the power plant. It causes acute and chronic health issues. In communities close to the power plant, exposures to such airborne contaminants are higher (Dara & Mishra, 2006). Coal combustion produces by-products, mostly coal ash that includes heavy metals (such as mercury, arsenic, cadmium and plumage), radioactive materials and minerals. Studies conducted in Tennessee show that coal releases highly toxic elements and environmental radioactivity (Ruhl et al., 2009).

Some studies indicate that communities, especially children and older people, residing near coal plants face health issues because of coal plants. The soil and water contamination from coal ash impoundments are more likely to be located near local, low-income areas. People living far from the plant also suffer due to coal combustion, as

contaminants deposited in the ecosystems are covered by a smokestack of up to several hundred kilometres. The height of the smokestacks and the wind conditions then decide the location of emissions. Coarse particulate matter (PM10), sulfur dioxide, nitrogen oxides, organic contaminants, heavy metals, acid gases and dioxins are all transportable up to 10 km from the power plant. Mishra explains that the most radiant radiation dumps, in fly-ash dumps, bring about serious health risks for local communities (Mishra, 2004).

In October 2019, a medical camp was set up in Qadirabad. Doctors noticed that a significant percentage of patients were suffering from breathing problems. Many respondents in Qadirabad believed that the power plant brought about health issues for them. A resident said, 'my mother-in-law is an asthma patient due to the power plant'. A senior doctor working in District Headquarters Hospital (DHQ) Sahiwal confirmed that the power plant caused diseases like asthma, lung disease, pneumonitis and allergy problems among the populace living in adjoining villages. Coal fumes and particulates caused skin diseases, photosensitivity and allergy issues in the long term. He believed that higher pollution levels would reduce the amount of oxygen in the local environment and affect the oxygen supply to the human brain (especially of locals).

During fieldwork, we observed that the state authorities and local officials did not try to assess the impact of climate change on public health. The state introduced development that was not suitable for [local] people's health and environment (despite understanding the connection between coal and health). The UN Intergovernmental Panel published a special report on climate change in 2018, which emphasized that pollution caused by coal burning should be quickly reversed and curtailed to avoid disastrous climate changes (Hoegh-Guldberg et al., 2018). In 2018, the IEA estimated that coal combustion was responsible for causing a 30% increase in global temperature (Marlin et al., 2018). Energy generation from coal has nonetheless continued, especially in developing countries like Pakistan.

The construction of coal power plants is not only a state's doing; international funding agencies and industrial states also share the responsibility. They bring development programmes to locals that do not benefit them. Sahiwal coal power plant, established to meet energy requirements, was constructed when developed states were reducing dependence on coal to generate electricity. The state authorities and funding agencies viewed coal as a cheap source of energy. They ignored the external costs of harm to human health and the environment caused by the coal-fired power stations. These developments came at a time when European Environment Agency (EEA) reports had shown that the most significant harm to health and environment caused by industrial air pollution came from coal power plants.

9 | CONCLUSION

This study highlights the negative impact of economic growth and development that causes climate change, environmental degradation and socio-economic problems. It is not only about the change at the micro-level but also about the transformation of a capitalist economy where the Pakistani state benefits from development. However, such a change is not beneficial for locals and their environment, which should sustain. The developmental logic operative at Sahiwal coal power plant is regulated in Qadirabad without any concern: the state enforced development programmes on locals without considering the impact on their health and environment. The concerned officials knew about the problematic nature of the power plant, but they preferred to ignore the costs for other benefits. Therefore, locals' reaction to the development discourse was natural because they did not want their environment spoiled for the sake of the state's misguided policies. They viewed the international development programs (in the form of Qadirabad power plant) as a new form of manipulation of the local environment and residents.

The above data show that using coal for electricity generation has significant environmental and health consequences. Sahiwal power plant is located near a community with a significant percentage of lower-middle-class residents. Although electricity produced from the power plant is transferred to areas far from Sahiwal, the community members endure most of the consequences because coal waste disposal often occurs in proximity to the plant. If coal is abundant, is technologically feasible and has few competitors, and risks are unknown, its use for energy production is a viable option. In today's world, better options are affordable that are cost-effective and have lower

externality costs. States like Pakistan may think about phasing out coal power plants for power production to save the local population and environment from calamities such as climate change and disease.

The public health effects of coal-firing power plants in Pakistan, especially Sahiwal, are disproportionately harmful to the people who suffer from socio-economic disadvantages. As an alternative, natural gas is environmentally friendly as compared to coal but its use as a favoured alternative to coal is questionable at best due to the impact of methane emissions on global warming. (Pakistan's inability to produce cheap gas and electricity further exacerbates its problems.) The state's financial woes and technological limitations also limit its ability to experiment with new technologies. Its ability to overcome the temptation of short-term solutions and continued deployment of clean, green energy to fulfil needs and assuage the threat of climate change are the only guarantee of sustainable development.

CONFLICT OF INTEREST STATEMENT

All authors declare that they have no competing interests.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

All the personal information is kept confidential to avoid giving away the identity of the respondents, such as name, address, and picture. Conversations can be noted in writing and audio recording, but the name and address are excluded from the recorded material. All participants involving this study are well aware of this study and fully know that the purpose of the study was academic.

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ENDNOTES

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