"From the backyards of the city, the river sings the blues"
Governance of Rivers in India
A Technographic Analysis of Subaltern Rivers in Madhya Pradesh

A THESIS

Submitted in partial fulfillment of the
requirements for the award of the degree
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by

NEHA SINGH

DISCIPLINE OF SOCIOLOGY
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CANDIDATE'S DECLARATION

I hereby certify that the work which is being presented in the thesis entitled **From the backyards of the city, the river sings the blues" Governance of Rivers in India A Technographic Analysis of Subaltern Rivers in Madhya Pradesh** in the partial fulfillment of the requirements for the award of the degree of **DOCTOR OF PHILOSOPHY** and submitted in the **DISCIPLINE OF SOCIOLOGY, Indian Institute of Technology Indore**, is an authentic record of my own work carried out during the time period from July 2013 to Aug 2018 under the supervision of Dr. Neeraj Mishra, Assistant Professor, Indian Institute of Technology Indore.

The matter presented in this thesis has not been submitted by me for the award of any other degree of this or any other institute.

signature of the student with date
(NEHA SINGH)

This is to certify that the above statement made by the candidate is correct to the best of my/our knowledge.

Signature of Thesis Supervisor with date

(Dr. Neeraj Mishra)

NEHA SINGH has successfully given his/her Ph.D. Oral Examination held on **<Date of PhD Oral Examination>**.

Signature of Chairperson (OEB) Date:	Signature of External Examiner Date:	Signature(s) of Thesis Supervisor(s) Date:
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Signature of Head of Discipline Date:		Signature of Convener, DPGC Date:

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DEDICATION

to my parents

with love, gratitude, and respect

SYNOPSIS

Introduction:

Governance of rivers in India finds itself at the crossroads where the environmentalists are demanding strict preventive measures to stop river pollution, watershed development programs, and rainwater harvesting laws to recharge the groundwater table and river streams. At the same time, the government is preparing to connect the Himalayan rivers with the Peninsular rivers in its grand interlinking of rivers program. While the support and opposition for both discourses and ideologies can be found, the state has been making policies and implementing projects that are directed towards solving the everyday problems in and around the river. At the same time, NGOs, civil society organizations, and 'green' institutions such as the National Green Tribunal (NGT) have also played a key role in persuading the state to frame policies for the protection of river ecology and ecosystems.

This thesis studies the governance of rivers in India from an ecological perspective to find out why after several decades of campaigning for, and expenditure on the rivers of South Asia, the cherished goal of a clean and unobstructed river has not been achieved, nor does it seem achievable in the current socio-political conditions. It uses the example of river Kshipra, flowing in the Malwa region of Madhya Pradesh[1], as a case study to examine the micro level policies, actors, institutions, and apparatuses that are assembled in the processes of everyday governance of rivers in India. Using the methodological lens of 'technography' (Bolding, 2004), this study describes and analyzes the technological and political interventions in the everyday governance of

[1] Malwa is derived from Sanskrit word *malav* (part of adobe of goddess Laxmi). Malwa plateau is in the north-central India. Erosion has carved the ancient lava flows into isolated mesas found throughout the plateau, together with an occasional sandstone hill (Lotha, 2010).

Kshipra river as well as the actors and institutions that are involved in the (re)shaping of these governance strategies.

The choice of river Kshipra as the case study was determined through my fascination with the *Simhasta Kumbh Mela,* one of the largest religious gatherings in the world, that is held on the banks of this river once in every twelve years. This choice was also tempered by a sense of frustration that there was so little known, written and researched about Kshipra, which was otherwise an immensely important river in Indian history and mythology, a river that had nourished the Malwa region and provided drinking water to the perpetually expanding cities of Indore and Ujjain. Today it is polluted beyond recognition and on the verge of disappearance, only kept alive by the piped water transported from the Narmada river located 47 km away.

This thesis has extrapolated the concept of "subaltern" to designate such minor tributary rivers, which only have a regional presence and are overlooked by the centralized planning of the state, which mostly funds projects aimed at the development of major rivers. Gradually such rivers have disappeared from the public sphere and are now on the verge of their geographical disappearance. This study attempts to highlight the plight of such abandoned sub-tributary rivers in the cities of India which are hidden from the eyes of the public. These sub-tributaries of major rivers have been categorized as "subaltern" because irrespective of the importance they hold for developing cities, they fail to qualify to be included in conceptualizing schemes, programs, and policies of the state. Instead, they are assumed to be included in the plans prepared for major rivers. This kind of disregard is one of the causes that leads to degradation of minor rivers.

This study argues for the need to go beyond and reinterpret, the empirical methods and their fundamental building blocks of research in river governance. One of the reasons for failure to achieve an agreeable river ecosystem and aquatic health in India can be located through the analysis of the instrument through which our knowledge of the rivers is communicated in the public

sphere which is predominantly empirical. This thesis argues that the philosophical foundations of empirical ecological studies, which form the basis of water policy making and governance measures, are shallow and seldom inquired into. It is one of the reasons for the failure of the ecological paradigm and prevents the popularity of ecologically sensitive statehood as well as citizenship. This thesis stresses the need for theoretical modeling and provides a critique of the empirical approach. It uses this approach to explore the area of river water governance, especially in India. A constructive approach to the study of river governance allows us to use theoretical perspectives and explore the philosophical foundations of the ecological ideology. This study aims to contribute to the interpretation of the way in which contemporary societies construct and process their socio-environmental issues using the example of river governance.

Statement of Problem:

The increasing deterioration of rivers has been emphasized in Central Pollution Control Board's (CPCB) report titled "River Stretches for Restoration of Water Quality" (2015). It identified 302 polluted stretches in 225 rivers, of which most were smaller tributaries of the major rivers in India. Despite the data, the emphasis nevertheless has been on the major rather than minor rivers, and the minor rivers like Kshipra have received minimal attention from scholars and policy-makers alike. Such minor tributary rivers have been designated as "subaltern" for the purpose of this study.

The term subaltern was introduced in Antonio Gramsci's 'Prison Notebooks" (1971)**.** For Gramsci, the word subaltern stands for any low rank person or group of people in a society suffering under the hegemonic domination of ruling elites. Ranajit Guha further developed the term subaltern in "The elementary aspects of Peasant Insurgency in Colonial India" (1983). For him, subaltern studies refer to the general attributes of subordination in South Asian studies whether in terms of caste, class, gender, age, and office or in any other way (Guha, 1982). In 1988 Gayatri Chakravorty Spivak critiqued this

understanding of subaltern and instead argued that there is no specific methodology which can define who and what constitutes subaltern. She is talking about the interdependence between elites and subalterns of the society. However, we note that from Gramsci to Guha to Spivak, the term "subaltern" has been used to understand the everyday lives of human society. This study extends this conceptual category to explore how it can be usefully employed to study urban rivers, keeping its anthropocentric allusion on hold, for the course of this study.

The term "subaltern" here refers to the smallest tributaries of major rivers, to understand the plight of minor tributary rivers in India, which are subjected to systematic negligence and institutionalized marginalization. This study shows that the smallest tributaries of major river systems have been neglected in the conceptualization and development of schemes, policies, and river rejuvenation programs in India. This means that the gaps in implementations affect minor rivers more than they affect the major ones. Interestingly, the problem further aggravates when the government uses purely technical solutions to solve the problem of deterioration of rivers which have been established as 'socio-natural' in the recent studies (Swyngedouw, 1996, p. 66), with explicit political, social and cultural components. The hard-engineering interventions such as dams, dikes, and locks are created to keep the river in its predefined structure and to guarantee the efficient functioning of the river system for human value. Therefore, the centralized hard- engineering responses take little account of fluvial processes and socio-political elements of the functioning of the river ecosystems, often exacerbating these problems. To explicate the dominance of purely technical approaches of river ecosystems for the management of deteriorating rivers, this thesis proposes using the theoretical and analytical framework of technography. Technography is 'observing and describing stages' of the technological development cycle (Kein, 2008). It helps to bridge the gap between nature and society (Bolding, 2004) and so it has been used in this study to evaluate the effects of technological interventions on the rivers in different socio-cultural contexts.

Objective of this study:

The main objective of this study is to explore the types of (socio)technical interventions that are used in the governance of "subaltern" rivers. It explores the circumstances under which the "subaltern" rivers become the sites of such interventions and how do these interventions affect the homeostasis of these rivers. It also attempts to highlight social, cultural and political factors and emphasize their role in river governance compared to the current literature which mostly documents the levels of pollution using chemical and biological components. Also, it explores how 'quick fix' solutions employed by the government affect the overall ecology of the river, and why such solutions are employed in the first place.

To address these objectives, the main research question of this study is as follows: what kind of socio-political processes lead to specific technological interventions on minor rivers and how do these technological interventions, in turn, affect social, political and ecological conditions of "subaltern" rivers? The sub-questions that this thesis addresses are: why are minor tributary rivers disappearing in India? What factors are responsible for (mis)governance of "subaltern" rivers in India? How do these factors collectively and individually affect the river governance processes?

Background and Location of the Study Area:

This study is located in the catchment of Kshipra river which is spread over 5600 square kilometers and is the southernmost part of Ganga River Basin. River Kshipra originates from the Vindhya ranges of Malwa region and flows northwards for 195 km to merge with river Chambal at Ismailganj village of Ratlam district of Madhya Pradesh, India. The main tributaries of Kshipra are Khan and Gambhir (and also Sarasvati) meandering through the cities of Indore and Ujjain. This thesis studies river Kshipra and its tributary Khan flowing in Indore and Ujjain districts of Madhya Pradesh.

The city of Ujjain, situated on the banks of Kshipra, finds itself in the list of seven sacred pilgrimages in India (Morgan, 1953, p.189-91). However, Kshipra does not make it to the list of seven sacred rivers despite being a tributary of Ganga and located on a sacred pilgrimage site. Even though Kshipra is referred to as the "Ganga of Malwa" and gets the honor of hosting *(Simhasta) Kumbh Mela* after every twelve years, it is not considered sacred enough in the dominant discourse. The extensive amount of sewage and industrial effluents flow into Kshipra from its tributary river Khan, which forms a confluence with it at Triveni Sangam near Ujjain, after flowing for about 33 km in the city of Indore. The evidence of perennial nature of Khan and Kshipra rivers in the past could be observed through their usage to supply water to the city of Indore and Ujjain till 1936, to fulfill the water requirements of these cities (Singh and Yadav, 2003, p.17). The over-extraction of water from these rivers exhausted their overall storage, making them seasonal rivers. Also, severe exploitation with the expansion of the cities on its banks, deforestation, discharge of industrial and domestic effluents into the river contributed to its alteration. Due to these reasons, there is an alarming pollution rate of minor rivers leading to Khan falling under priority-I of polluted rivers in India, and Kshipra under priority-II as per the governmental records (CPCB, 2015).

The Kumbh Mela of 2016 exhibited some of the socio-technical interventions that were employed in the governance of these rivers in Madhya Pradesh. The religious leaders who hold a prominent place in Kumbh Mela complained about the open drains flowing in Kshipra and making it dirty. They demanded that government should clean Kshipra and divert river Khan from flowing into it. From the year 1985, the government tried to clean river Khan, but all its attempts could not be successful due to financial constraints and lack of co-ordination between different government departments. In the year 2015, the pressure from the religious leaders and the local administration's unsuccessful attempts to rejuvenate river Khan finally resulted in its diversion for 19.25 km, under Khan Diversion Project (KDP), from the main sites of Kumbh Mela

region in Ujjain. Even though this project was declared complete for essential bathing sites of Kumbh Mela, river Kshipra still carried sewage for the month-long festival due to open channels of sewage adding their waters into the river.

There was another project which was government's attempt to make Kshipra perennial, and to provide a continuous flow of water to take bath during Kumbh Mela. Under this project, river Kshipra was connected to river Narmada with the help of Narmada-Kshipra Simhastha Link Project (NKSLP). This was not the first Kumbh Mela in which the government used 47 km long pipeline to bring water from Narmada river to Kshipra for the month-long festival. There were three other times when the government resourced water from Gambhir river to fulfill the water requirements for Kumbh Mela. For instance, in the year 1980, a dam was constructed on the banks of the Gambhir river to augment the drinking water supply of another 5 MGD. In 1992, the capacity of the dam was increased to 7.5 MGD, and later in 2004, it was further increased to 12 MGD approximately from the same river (Singh and Yadav, 2003). Incidentally, all these years coincided with the celebration of *Simhasta Kumbh Mela* on the banks of river Kshipra.

These projects are suggestive of 'quick fix' solutions to the problem of the deteriorating rivers caused by excessive groundwater extraction, shorter monsoon, climate change and urbanization. Besides, these rivers tend to receive industrial effluents, domestic sewage which has affected the flow of these rivers, making the condition even worse. Water quality index of Kshipra varies from 36-49 after Triveni Ghat which is of inferior quality and therefore the water that flows in this river is unsuitable even for bathing (Gupta et al., 2012; Nighojkar and Dohare , 2014). According to the data collected from the field, the alarming rate of pollution also affected the biodiversity and aquatic life of Kshipra. According to some reports, hundreds of fishes were found dead

due to chemical discharge in the year 2013[2]. A news article also reported the same problem due to increasing pollution in the river in the year 2016[3].

Even though *Simhasta Kumbh Mela* is held after every twelve years on the banks of Kshipra, which should make it relatively sacred by all standards, popular writers like Sanyal (2012) and Aitkens (1992) in their description of India as the land of seven rivers or " *Sapt Sindhu*", only consider the rivers mentioned in the Vedic texts and overlook the contemporary rivers. The seven rivers that they mention in their texts are widely recognized due to popular perception that there are only seven sacred rivers in India, which has also led to the marginalization of other such rivers in the public sphere. Such essentializing notions leave no space for smaller rivers that contribute to sacred festivals like Kumbh Mela. In addition to this, physical maps of India often refer a minor river as a tributary of a major one. For instance, most maps of Ganga Basin show river Kshipra that flows from Indore marked as Chambal, or sometimes marked as Upper Chambal Basin. The neglect of smaller rivers by lack of proper mention underplays their importance. This leads to the reduction of its recognition and identity as a river in the public sphere, culminating in further oversight at the policy level also.

For river development schemes and projects, government sanctions the budget for major rivers like Ganga and Yamuna. For instance Ganga Action Plan I and II, Yamuna Action Plan I and II, rejuvenation of river Ganga and Yamuna under National Ganga River Basin Authority and Namami Gange Plan. In such schemes and programs government projects all the tributary rivers as included under the names of major rivers, and minor rivers lie abandoned in the developing cities.

This trend was also observed in the fieldwork and literature review for this research. For major rivers like Ganga, one can find research in both natural and

[2] TV 18 report.
[3] Sharmal, M. (2016), "Toxic water kills thousands of fish in Kshipra", Times of India News, Indore.

social sciences. For instance, Mutiyar and Mittal (2013) discuss the organochlorine pesticides polluting the river water. In social sciences, Kumar (2017) explains the historical, cultural, spiritual and socio-economic attributes of Ganga Basin. Some studies have considered the way water flows are altered in the river system by hydroelectric projects (Alley, 2015, p. 409). Contrastingly, for "subaltern" rivers like Khan and Kshipra, the focus has mostly been on empirical studies like Rizwan et al. (2016) to show that BOD, DO, TDS level of Kshipra river is very high due to huge amount of untreated sewage and municipal discharge in the river. Such studies have also motivated the need to conduct qualitative research on the "subaltern" rivers and to bring them to the forefront so that the problems associated with these rivers could be addressed in a systematic manner.

The concept of "subaltern" rivers used in the study

This study develops the idea of subaltern from Spivak's understanding of the concept and her interpretation of Marx's idea of class consciousness. Based on her debates between oppressed and subaltern, this study proposes to explore the major rivers as elites and minor rivers as subaltern[4]. In a process to deal with the deterioration of rivers in India, various policies, programs, and projects were made for the major rivers, but the smaller tributary rivers were ignored in terms of representation and planned intervention. This could also be observed through the cartographical representation of minor rivers through major ones, as explained above.

This study categorizes minor rivers as "subaltern" to create a mental and conceptual space for such rivers which lack representation at various levels. This has been explained with the help of three issues which provide insights about the minor rivers- cultural marginalization of smaller rivers, knowledge

[4] Spivak explains subaltern as much more extreme cases of oppression and by that she means all oppressed cannot be subaltern, but all subaltern can be oppressed.

production related to smaller rivers and considering smaller rivers as insignificant in comparison to stems of major rivers.

Theoretical Framework: Technography

Kein (2008) defines technography as "observing and describing stages" of the technological development cycle. Paul Richard coined the term to explain 'a desire to develop an ethnography of technology based on empirical observations' (Ingold, 1994, p.336**).** It became a compelling methodological approach in the 'Technology and Agrarian Development' research group of Wageningen University in 1980 (Jansen and Vallema, 2011).

Bolding (2004) discusses the state-engineered attempts to modernize African agriculture and explains socio-technical engineering with the help of the technographic approach. In order to explicate how state-engineered attempts can be both right and wrong, he used the technographic approach to understand three models of irrigation in Africa. He calls technography a new methodology and proposes a combination of three components to study the irrigation settlement schemes. These components are biography, ethnography, and technology. I have taken the idea of Bolding (2004) and extended it to design a conceptual framework to study the socio-technical interventions in the governance of "subaltern" rivers in India. For this purpose, Khan as the "subaltern" river is perceived as a natural resource which was already existing in Indore. Slowly people settled on its banks, the city grew, and the interaction between the river and humans increased. This way, river Khan made an essential contribution to the lives of the people of Indore. This can be considered as an instance of interaction between nature and society. To discuss such patterns of interaction as presented in figure 1, I utilize the three components given by Bolding. The first component is biography which has been used to discuss the history of interaction between rivers and socio-technical interventions. This component explains the differences between modern technological changes and the traditional technologies used in the past. The second component of ethnography has been used to discuss the society

and river interaction. This component expresses the everyday interaction and gradual alienation[5] from nature that took place in the urban society. The third component is technology or the technical interventions that has been discussed as the interaction between society and natural resources. Using this component, the study explores the interaction between politics, society, religion, and technology and aims to explicate the processes of "subaltern" river governance in urban India. The figure1 below provides the conceptual framework of the study.

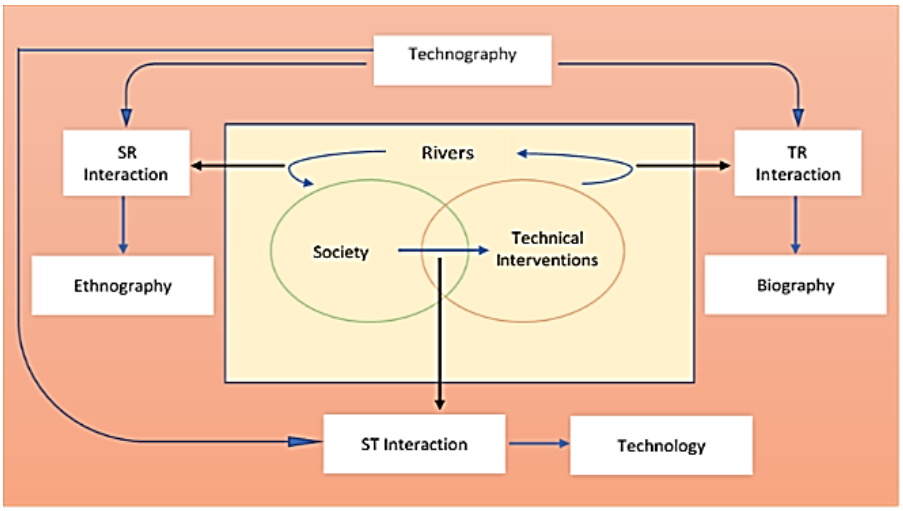

Figure 1: Conceptual framework of the study

Methodology of Study:

This study uses the work of Hannigan (1995) and Scott (1998) to operationalize technography and develop a conceptual framework to understand river governance in India. It is based on three core principles: critical theory (examining human domination), interdisciplinarity (social, technical and

[5] Marx provides, a cautious constructionism, fully in tune with his own practical materialism, which always emphasized the role of human practices, while remaining sensitive to natural conditions, evolutionary change, and the metabolic interaction of humanity and the earth. Lack of sensitivity towards nature leads to alienation of humans from nature (Foster, 2002).
Foster, J. (2002), Capitalism and Ecology: The Nature of the Contradiction. Monthly Review, 54(4). http://monthlyreview.org/2002/09/01/capitalism-and-ecology/

natural aspects and their interplay) and case study of Kshipra and Khan rivers. Technography is used as a methodological lens, disaggregated into its three components of ethnography, biography, and technology, as explained in the figure above. Using these three components, the study analyzes the data obtained through fieldwork. This has been discussed below in three parts:1) analysis of ethnographic data collected on the banks of river Khan; 2) analysis of Khan Diversion Project under the subheading 'Khan-from pollution to diversion'; 3) analysis of Narmada Kshipra Simhastha Link Project under the subheading 'the changing contours of Kumbh Mela'.

On the banks of river Khan: This study provides the details of one stretch of the river, i.e., from Ralamandal to Pardesipura. Following this order, I discuss the perceptions of the river among the communities and the administration in Indore city. According to the community's perception, increase in industries and expansion of population was the primary cause for pollution on the banks of Khan. Hannigan (1994) argues that industrial revolution dragged people from rural to urban areas. They were removed from their native lands and driven into crowded, polluted cities like Indore where even the soil was drained of its vitality (Parsons, 1997, p.19). The interviews with people living on the banks of the river in Shankarbagh, Khatik colony, South-toda, Kabootarkhana, and North-toda revealed that some of the residents are migrants from nearby villages and cities. The residents of these areas were found to be extremely poor and mostly engaged in menial work such as waste collection, daily wage laborers, house maids, etc. These littoral residents were truly subaltern in all senses of the term, which also induced the idea of conceptualizing their living spaces on the river as "subaltern". Walking this stretch on the banks of "subaltern" Khan showed that deterioration of such rivers is an outcome of purely technical interventions that has ignored/overlooked the effects on socio-natural composition of the river. The residents have become alienated from the river which was once an important location for the socio-cultural activities. Many older respondents recalled that the river was clean earlier, and they went

there for bathing as children. But today they almost never go to the river side as the river has an overpowering stink.

Khan- from pollution to diversion: This part describes and analyzes the Khan diversion project that took place before (*Simhasta) Kumbh Mela*, 2016. I visited the area from Pipliyaraghao (zero point) to Kaliyadeh village (end-point). River Khan was to be diverted for 19.25 km with an expenditure of Rs. 100 crores. The tender from K.K. Spun[6] was accepted by the government in October 2014, and the project was sanctioned on 18th November 2015. The project was expected to provide 13 irrigation wells. It was found that the land structure and terrain was unknown to the builders of this project and there seemed to be an urgency to finish the project fast. As Scott (1998, p.3) argues that the maps provided to the contractors did not successfully represent the actual status of the grand reality, but only a slice of it. Technology combined with the state power was in the process of refashioning not just the nature of the river, but also the lives of the farmers whose land was selected for the diversion project. In this sense KDP is a good example of how infrastructural development projects with little (or no) participation of people have proved to be disastrous. Such projects are exemplifications of the dominant system which develops at the expense of lives and livelihoods of the poor.

The implementation of the project was such that the administration assumed and exercised full control over water and land in the project area. This project has been interpreted using high modernist ideology as discussed by Scott, which showed that the government in a process to manage dirty water, implemented a new project and showed that both people and water can be controlled with the combination of technology and state power.

The changing contours of Kumbh Mela: The state government inaugurated the *Simhastha Kumbh Mela* 2016 with the slogan "Green *Simhasta"* and proposed to keep the *Mela Kshetra*[7] clean with the help of various religious

[6] A construction company based in Faridabad, Haryana which provides precast concrete solutions for infrastructure development.

[7] Place where Kumbh Mela was celebrated

organizations and religious leaders. Initiatives like planting trees were promoted to make the *Mela Kshetra* greener. The field data found that the amount of deforestation was more as government constructed new ghats[8] and 46000 toilets in Kumbh Mela generating 50 tons of waste due to poor constructions. More than 2500 farmers and their agricultural lands were used to organize the *Simhasta*, affecting their livelihoods. Thus, it can be said *Simhasta* 2016 was not so green relative to its propaganda. This part concludes that there has been a change in cultural practices of Kumbh Mela. As river Kshipra runs dry in the summer months the state implemented pipeline project to transfer water from River Narmada to fulfill the ritualistic bathing in this festival. By exploring the contours of Kumbh Mela, it became clear that technological interventions on the rivers in India have an acute socio-political and religious component. The socio-political drives the technical interventions as seen in the construction of NKSLP as well as KDP. While the first project was undertaken to transfer water *to* river Kshipra using pipelines, the other project was undertaken to transfer water away *from* the river using pipelines. Both projects mirror the socio-religious linkages of the technical interventions in governance of rivers in India, as they were undertaken in the wake of *Simhasta Kumbh Mela* and its efficient performance.

Structure of Thesis:

This thesis comprises of six chapters. Chapter 1 is the introduction of the thesis. This chapter outlines the context of the study, and the problems associated with the governance of such minor rivers in India. Chapter 2 provides the background of the study. It builds the case for categorizing the minor rivers as "subaltern" and establishes its usefulness for a qualitative analysis of such rivers. This chapter also shows the declining importance of "subaltern" rivers in India, especially in the Kshipra River Basin. Chapter 3 explores the genealogy of river governance in India and locates the main research gaps that have created a crisis in Indian river governance.

[8] Sections provided near the river to take bath and perform rituals.

Chapter 4 provides the theoretical and methodological framework. It describes the emergence of technography as methodological lens in water governance and develops it as an analytical framework to study the governance of "subaltern" rivers in India. Chapter 5 presents the analytical part of this study. The objective of this chapter is to interpret the fieldwork data with the help of the analytical framework developed in the last chapter using the components of technography and their interactions with each other.

Chapter 6 of the thesis concludes by observing the need for a paradigm shift from a purely technocratic approach towards a more socio-ecological and integrated river management approach and the advantages of such a shift, especially for the "subaltern" rivers. This would help in the rejuvenation of the minor rivers and bring them back into the dominant planning discourse on river governance in India.

Summary of the findings

This study develops a conceptual category of "subaltern" rivers which can be useful in the research on river governance in India. It finds that less attention has been given to smaller rivers like Khan and Kshipra due to the absence of sufficient theoretical approaches, and dominance of empirical methods in water research. Therefore, these rivers are under-represented in the research arena, policies, programs, and schemes, which have been enumerated as "subaltern" in the title of this thesis. These rivers were once the lifeline of the cities, but today they have degraded into a conduit that transfers water from one place to another, and also into a sewage and garbage dumping site. The disappearing rivers like Khan and Kshipra also signal the broader phenomena of increasing human alienation from the environment, which was observed in the case of river Kshipra and the people living on its banks. Under the pressures of electoral politics, the state has favored a selective adoption of reviving and repairing large rivers such as Ganga at the cost of many other marginalized ones such as Kshipra. It shows how the rivers in India are subjected to short-

term technical interventions, driven by socio-political compulsions, but presented as a purely technical enterprise.

The usage of the technical interventions are associated closely with centralized planning and state-dominated large-scale infrastructural development. It is focused on providing people with immediate solutions and solving the immediate problems, with less concern about how such 'quick fixes' may not be sustainable in the long run. This study is an attempt to make the "subaltern" rivers visible which are the part of major rivers and are getting affected by expanding cities. In this process, the study critiques the sole dependence on empirical methods for studying rivers and emphasizes the development of theoretical approaches in conjugation with empirical methods to study river governance in India.

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GLOSSARY

Acre	43560 square foot
Akharas	it is a Sanskrit word denoting a place of practice with facilities for lodging, boarding and education for a particular sect or order.
Beegha	land measurement unit (1 beegha = 0.33 acres)
Chattri	cenotaph
Crore	1,00,00,000
Ghat	a flight of steps leading down to a river
Gram Panchayat	the elected council of the village
Janeoo sanskar	tying the sacred thread
Kali yuga	an unspiritual age of ignorance, sin and short lifespan
Lakh	100,000
Mandir	temple
Moksha	salvation
Mundan sankar	the first ever shaving of a child's head
Naga Sadhu	naked yogi
Nallah	open drain
Panchayat Sahayak Sachiv	the Panchayat Secretary appointed by state government
Pandit	priest
Sarpanch	the elected head of the village
Simhasta Kumbh Mela	Hindu festival of taking dip in holy water
Sthal	place

ACRONYMS

ANT	Actor Network Theory
BOD	Biological Oxygen Demand
CPCB	Central Pollution Control Board
CGWB	Central Ground Water Board
DVC	Damodar Valley Corporation
DFID	Department of International Development
DoPR	Department of Public Relations
GAP	Ganga Action Plan
HIS	Hydrological Information System
IBI	Index of Biological Integrity
IDA	Indore Development Authority
IHD	Indore Habitat Development
IMC	Indore Municipal Corporation
ISWD	Inter-State Water Disputes
JNNURM	Jawaharlal Nehru National Urban Rural Mission
KDP	Khan Diversion Project
MP	Madhya Pradesh
MPPCB	Madhya Pradesh Pollution Control Board
MGD	Million Gallons Per Day
MoWR	Ministry of Water Resources
MoWR, RD, GR	Ministry of Water Resources, River Development, and Ganga Rejuvenation
MPN	Most Probable Number
NKSLP	Narmada Kshipra Simhastha Link Project
NAPCC	National Action Plan on Climate Change
NGRBA	National Ganga River Basin Authority
NGT	National Green Tribunal
NRCP	National River Conservation Plan

NWP	National Water Policy
ODA	Overseas Development Administration
PHED	Public Health and Engineering Department
PDS	Purpose Driven Studies
PRI	Panchayati Raj Institution
RBA	River Basin Authority
SDM	Sub- Divisional Magistrate
STP	Sewage Treatment Plant
UNFCCC	United Nations Framework Convention on Climate Change
UASB	Upflow Anaerobic Sludge Blanket
WHA	World Health Association

ABSTRACT

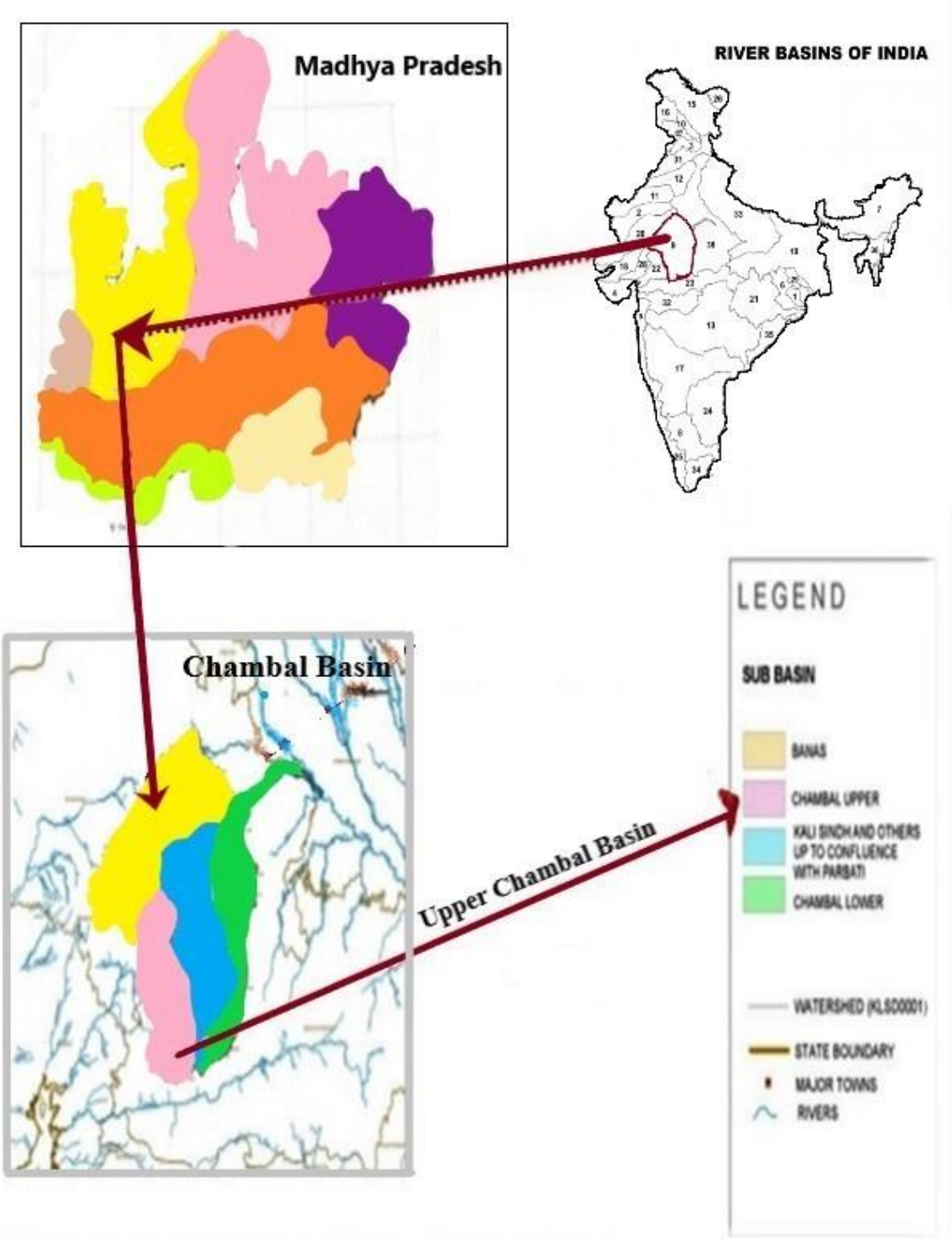
Governance of rivers in India is in a crisis today, where environmentalists demand strict preventive measures to stop river pollution. They also overture development of watershed programs and rainwater harvesting laws to recharge the groundwater table and river streams. Simultaneously, the government is also using technical measures like connecting the Himalayan rivers with the Peninsular rivers through grand interlinking projects. Both these discourses have been supported and contradicted for resolving the everyday problems in and around the rivers. In this study, governance of rivers is examined through an ecological perspective. The study analyses the reasons of the failure of river cleaning projects despite the huge amount of expenditure made for the major rivers in India. The thesis makes use of the case study of the Kshipra (and its tributary Khan), flowing in the Malwa region of Madhya Pradesh. This river has been recognized as the minor tributary of the Ganga. This thesis investigates the micro-level policies, institutions, actors, and apparatuses that coadunate in the processes of everyday governance of rivers in India.

The examples of minor tributaries like the Kshipra (and its tributary Khan) have been extrapolated through the concept of "subaltern". Ironically, the importance of these minor rivers that constantly supply water to various cities, fail to be included in conceptualizing schemes, programs, and policies of the state. Rather they are included in the plans prepared for major rivers. This concept has been used to explain the neglect that minor tributaries like these faces. It is due to the centralized planning of the state, which mostly focusses on the projects designed to target major rivers. Such kind of planning leads to the gradual disappearance of minor rivers from the public sphere which eventually become the cause of their geographical extinction.

This thesis argues that the philosophical foundations of empirical ecological studies, which form the basis of making water policy and governance measures, are shallow and are hardly inquired. This is one of the reasons for

the failure of an ecological paradigm which further detters the popularity of ecologically sensitive statehood as well as citizenship. This thesis stresses the need for theoretical modeling and provides a critique of the empirical methods.

The utilization of technical solutions to comprehend the deterioration of rivers have exacerbated this problem. The hard-engineering interventions such as dams, dikes, and locks are created to keep the river in its pre-defined structure and to guarantee the efficient functioning of the river system for human values. By elucidating the dominance of purely technical approaches of river ecosystems for the management of deteriorating rivers, this thesis proposes using the theoretical and analytical framework of technography. It is an approach which is used to observe and describe various stages of the cycle of technological development. It is used in this study to bridge the gap between nature and society. It is also used to evaluate the effects of technological interventions on the rivers in different socio-cultural contexts.



Map 1: The Upper Chambal Basin which represents the Kshipra Basin of Madhya Pradesh, India. (Source: CGWB)

Chapter 1: Introduction

This thesis studies the practices and policies of governance of rivers in India from an ecological perspective. In the last 50 years, huge amounts of expenditure has been made for cleaning the rivers of South Asia. However, the conditions of the rivers have only deteriorated. With the case study of the Kshipra and its tributary Khan flowing in the Malwa region of Madhya Pradesh[9], this study argues that governance of rivers in India is a complex socio-technical process which requires both qualitative as well as quantitative approaches of study for a meaningful understanding. While most studies on rivers of India have focused on the major rivers such as the Ganga and the Yamuna, very few researchers, have studied smaller tributaries of these large rivers. This has caused a significant degree of degradation of the river ecosystems. The problem has further aggravated with the urban expansion of India, leading to the deterioration of rivers, both large and small, especially in the large as well as the smaller cities of India. Today, the very rivers which once contributed to the growth of the town have now become *nallahs*[10] in their backyards. This problem has also been highlighted in one of the recent reports of the Central Pollution Control Board (CPCB), the central government authority responsible for research on pollution of water bodies, under the Ministry of Environment, Forest, and Climate Change.

In 2015, the CPCB in a report titled "River Stretches for Restoration of Water Quality" embarked on the most ambitious survey on river pollution ever undertaken in independent India. The survey covered 445 rivers in 29 states and 6 union territories. It was concluded that more than 60% of the surveyed

[9] Malwa is derived from Sanskrit word *malav* (part of adobe of goddess Laxmi). Malwa plateau is in the north-central India. Erosion has carved the ancient lava flows into isolated mesas found throughout the plateau, together with an occasional sandstone hill (Lotha, 2010).

[10] Open drains

rivers were polluted. The reasons that were provided for the deterioration of the rivers were rising density of human population on the river banks; poor sanitation conditions of the communities living in close proximity to the rivers; the damaging discharge of untreated domestic wastewater and industrial effluents into the river; environmentally damaging religious practices such as the immersion of idols, ashes and flowers and the human remains; agricultural runoff, cattle washing; and, untreated, undetected and toxic pesticides (CPCB, 2015; Priyadarshi, 2011).

The CPCB report identified 302 polluted river stretches on 225 rivers in India. The report recognized that it was mostly the smaller tributaries that were polluted due to excessive sewage dumped at an alarming rate. The sewage dumped in the rivers had increased from 38,000 MLD[11] in 2009 to 62000 MLD in 2015. The increase in sewage was mainly due to the appalling lack of essential infrastructural facilities (such as sewage treatment plant) which have been woefully unable to cope with the demand for effective sewage management. In consequence, the sewage dumped into the rivers has registered a steep increase from 26,200 MLD in 2009 to 38,000 MLD in 2015 (Khambete, 2017).

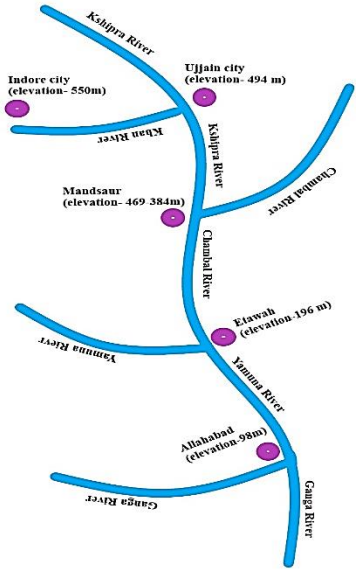
Unsurprisingly, the deterioration of rivers has also led to other social problems such as: water scarcity, health challenges, using toxic water to grow crops, slum sprawl and increase in the discharge of waste. In this context, the Government of India has stilted a variety of technological solutions as feasible alternatives. For instance, this can be seen in a brief discussion on the government's policy towards the treatment of river pollution in the Ganga. The two 'action plans' (GAP- I (1986) and GAP-II (1993- 1996)) created to clean the Ganga, had an impressive budget allocation for Rs 938.57 crores to construct sewage treatment plants in towns, this plan could not do very well. Undeterred, the government launched an even more ambitious scheme- Namami Gange Plan (NGP). Here the initial sanctioned budget was Rs 20,000

[11] Million Liters Per Day

crore. NGP is the flagship river rejuvenation program of the government. It is currently under the Ministry of Water Resources, River Development, and Ganga Rejuvenation. It aims to end pollution in the river Ganga, conserve and rejuvenate it. There are reports suggesting that the National Mission for Clean Ganga (NMCG) the nodal agency to utilize amount allotted for cleaning the Ganga under NGP could not utilize the funds due to the absence of a long-term plan and lack of pollution abatement measures (Aggarwal, 2017). These are the plans through which the government was trying to accommodate the sewage produced from towns into the pipeline and connect them to sewage treatment plants. This program aimed to efficiently manage sewage produced in cities by diverting them to treatment plants. However, the plan so far has come under a lot of flak mainly due to badly maintained drainage pipelines which frequently malfunction. Consequently, there has been an increase in sewage flow into the basin.

Furthermore, this study emphasizes that the problem is not restricted to the major rivers, indeed "subaltern" rivers are also afflicted with similar complaints. For instance, a "subaltern" river of the Ganga, the Kshipra has very similar problems as the Ganga itself. The responsibility of rejuvenation of river Kshipra falls under the aegis of the Madhya Pradesh government. In 2013, the state government created the Narmada Kshipra Simhastha Link Project (NKSLP) for river rejuvenation. An impressive budget of Rs. 432 crore was earmarked for the purpose. However, Kshipra faced a unique problem, i.e., its largest pollutant was one of its tributary rivers- the Khan. Unfortunately, the Khan brought both sewage and sludge in very high quantities to Kshipra. To solve this problem, the Khan Diversion Project (KDP) was undertaken at the cost of nearly Rs. 100 crore. The idea was to ensure a relatively clean Kshipra river in time for the *Simhasta Kumbh Mela*, 2016. However, the NKSLP and KDP could not be very successful due to unsustainably high energy consumption and financial expenses. This suggests that the social problem of deterioration of rivers has been insufficiently addressed. In this case, modern technology seems to be abetting the deterioration of rivers than preventing it.

The hydrology has been manipulated politically for centuries, for example through the layout of drainage networks, the damming and diversion of rivers, the interlinking of tanks, or the repositioning of channels (Mosse, 2003). The disproportionate importance given to technological solutions and the absence of any thought on the social context of river systems has led to a permanent and damaging change. This thesis makes an attempt to identify the processes that constitute this socio-technical context. Specifically, to explore the contours of this problem with a sustained focus on the governance of "subaltern" rivers like the Khan and the Kshipra which have been neglected so far in current scholarly literature and policy discourses. The objective here is to give voice to the minor rivers which have so far but flowed as a drain in the backyard of the city. Besides, this study explains that minor rivers turning into abandoned rivers flowing in the backyards are not only the problem of one city, but they are the problem of the other cities where it forms a confluence with another river. This convergence can be understood in the following manner: Indore city is at an elevation of 550 m; the sewage of this city flows into river Khan. This river further meets the Kshipra at Ujjain which is at an elevation of 494 m. This river further meets the river Chambal at Mandsaur which is at an elevation of 469 m to 384 m. The Chambal in its turn meets the river Yamuna at Etawah which is at an elevation of 196 m. The Yamuna meets the Ganga at Allahabad which is at an elevation of 98 m. Therefore, it can be seen that the sewage flowing in the Khan is affecting the Yamuna and the Ganga. This explains the need for upstream and downstream synchronized planning, which has been found lacking in the understanding of the governance of rivers in India.



Map 2: shows each tributary river joining its major river in various cities in India

Emphasizing on the idea of upstream-downstream communication, it is argued that this negligence has given rise to essential concerns: i) subalternity of minor rivers; and, ii) a woeful lack of emphasis on their governance. These problems will now be discussed in turn.

For the first time, the term "subaltern" was introduced by Antonio Gramsci in his work, "Prison Notebooks" (1978), a series of essays. For Gramsci, the term "subaltern", refers to any low-rank person or group of people in a society suffering under the hegemonic domination of a ruling elite class. He thinks that such kind of domination deprives these low-rank people from their basic rights of participation in shaping of local history and culture as active individuals of the same nation. The idea of subaltern was further developed by Ranjit Guha in "The elementary aspects of peasant insurgency in colonial India" (1983). Guha mentioned that "subaltern" could be the name of the general attributes of subordination in South Asian society. He expressed that it can be in terms of class, age, gender, caste, and office or in any other way. In 1988 Gayatri Chakravorty Spivak through her article "Can the subaltern speak?" critiqued

this understanding of subaltern and provided it a broader meaning. Spivak argued that there was no specific methodology which could define who and what constitutes subaltern. She chose to adopt the notion of the 'subaltern 'essentially because it was truly situational. She further discussed the interdependence between elites and the subaltern of the society. She opined that subaltern cannot be the center of discussion without considering the elites of the society (Spivak, 1988).

Explaining the concept of "subaltern" rivers

The concept of "subaltern" rivers in this study, is derived from the understanding of Spivak (1988) who developed it using the Marxist interpretation of class consciousness. Spivak's account is in alignment with Marxist account of subject formation as a consequence of class consciousness in opposition to the French post-structuralist thinker, Foucault and Deleuze. To her, the understanding of "subaltern" is a severe form of oppression where there is no recognition of such oppression happening. She thinks that a real "subaltern" does not have a conduit through which there is a means of recognition. So, it can be inferred through her article that all "subalterns" are oppressed, but all oppressed are not "subaltern". For her, the "subalterns" desire, interest, and intent are dislocated. Contrary to what Foucault and Deleuze think about subject and subjectivity as united calling it "undifferentiated desire", Spivak uses the Marxist model to explain that subject is profoundly divided. The division within the subject is the condition for the possibilities of subjectivity (Hall et al., 1988)

Marx is obliged to create a divided and dislocated subject whose parts are neither continuous nor coherent with each other. Therefore, based on this understanding, Spivak's article highlights the following points: implementation of the law as a mechanism of "epistemic violence" which means the infliction of harm against subjects through a discourse which comes from an understanding of oppressed by Foucault and Deleuze. Employing a strategic form of educational indoctrination, i.e., to teach a person or a group

to accept a set of beliefs uncritically. Where Foucault and Deleuze feel that "subaltern" have access to speak, the sub-proletariat can speak for themselves. Because for them labor and value are the same. This creates a wider gap between labor and value. But according to Marx, under capitalism value is produced as necessary and the emphasis is on surplus labor. Labors are distinct from human activity. Spivak says that the oppressor has no interest in the oppressed, so it is not possible for the oppressor to present the oppressed, or in this condition, the oppressed will not be allowed to speak for themselves. There is no sign of acknowledging the idea that the oppressed exist, as the oppressor does not value their existence. This means that the subject's itinerary has not been considered to offer any contribution. Her article mentions that if the subaltern do not have a history of their suppression and they cannot speak, then they are more deeply in shadow. She mentions that the hegemonic power in which mostly a different level of oppression is discussed, the subaltern do not find any space.

Deriving the idea of "subaltern" rivers from her understanding involves debating the idea of elite and "subaltern" in rivers in India. Major rivers like the Ganga, the Narmada, the Kaveri, the Yamuna, the Godavari, the Brahmaputra, and the Krishna are some of the examples of elite rivers. They are considered elite as the focus of schemes, programs, policies, projects, and research have been on these rivers. While the minor rivers, the sub-tributaries like the Khan and the Kshipra are "subaltern" because of lack of significant acknowledgment of these rivers. These rivers are categorized "subaltern" in this study as they are under-represented or not represented while conceptualizing schemes, policies, and programs in India. According to this study by making major rivers the central point of discussion in research as well as in the governance, makes the smallest tributaries "subaltern".

The term "subaltern" has been used for minor rivers to create a mental and conceptual space for these rivers which lack representation at four levels: at the central level, state level, its location in the city, and at the community level.

i) At the central level, the schemes for "subaltern" rivers are included in the schemes meant for main rivers. For example, the Namami Gange Plan (NGP) includes cleaning of the river Ganga and its tributaries, but its implementation remains limited to the Ganga and the various major cities where it flows; ii) at the state level, other major tributaries of the main river becomes the focus like the Chambal, Betwa, Son, Ken, etc. The schemes at state level are planned in such a way that the focus is mainly on major tributary rivers, while the minor tributary rivers of the major rivers get ignored; iii) at the city level, its catchment is occupied by construction, formation of slums and industries, so these rivers can be seen in the alleys of the city filled with sewage, sludge, and waste; iv) at the community level, the non-perennial nature of such rivers creates more space for the littoral residents. Most of these littoral residents want these rivers to remain dry all the year round as it provides them more space to stay at a low cost. It shows that when a minor river loses its representation at central level, it slowly affects the representation at various other levels.

These rivers are considered "subaltern" due to three counts[12] which provide insights of minor rivers: 1) cultural marginalization of minor rivers, 2) knowledge production and minor rivers, and 3) comparison of minor rivers to major rivers.

Cultural marginalization of minor rivers:

India being a secular country has collective solidarity in terms of rituals like bathing during the Kumbh Mela. For such ritual, the rivers hold a national importance. Culturally, India is identified and represented through its main rivers like the Ganga, the Narmada, the Krishna, the Brahmaputra and so on. These main rivers and their tributaries have been worshipped as goddesses. Since old days our ancient texts have provided a collective memory of all the rivers regardless of their being major or minor tributaries. Their importance

[12] These issues are derived from an article by (Ray and Radhakrishnan, 2010)

has been highlighted according to their confluence of major river, but it is only the major rivers that get all the recognition. Therefore, the cultural importance of major rivers has been handed down through generations in such a way that they have become the master narratives displacing the narrative of minor tributary rivers, which regionally are considered to be sacred for a group of people. So, the master narratives of major rivers become a single narrative of the nation, ignoring the narratives of the smaller tributary rivers. Therefore, at the political level, minor and major rivers are portrayed in such a way that political discourse on major rivers, which in this case are the elite rivers serves as a symbol of technical interventions making the minor rivers "subaltern".

Knowledge production & minor rivers:

During the colonial period the relevance of ancient texts reduced, as they were in various regional languages, then English was used as a medium of communication. The significance of rivers was explicitly explained in regional languages about both major and minor rivers. But the main discussions centered on the major rivers became the widespread belief that there were only seven rivers in India. This kind of understanding gave rise to popular discussions of major rivers, thus further ignoring the identity of minor rivers because of their dislocation, complexity and holistic nature despite being an integral part of the major rivers.

Dislocation stands for the difference in local geography and culture of minor rivers. So, their presentation as a minor river should be directed to address the local geography and culture of the region. The complex stands for rivers not being a simple water body which carries water from one place to another. Rather, the presentation of minor rivers should be related to its interaction with innumerable organisms like microbes, plants, animals, and humans. Further, these minor rivers function as a medium of transportation of goods and services. The minor rivers which confluence with the major ones are not just a subsystem but are rather connected by the continuous flow of water. This continuity determines the characteristics of the downstream in the composite

ecosystem (Iyer, 2015; Boon and Raven, 2012; Likens, 2010). A holistic view of the river can be seen as a nested system of geomorphological, hydrological and ecological processes, which needs to be dealt with at the river catchment scale. The river basin as a whole is therefore seen as an appropriate scale to make choices for interventions and measures because only then all interferences can be considered (Boon, 1998; Meijerink and Wiering, 2009). Such an insight is necessary to look at the compromises that are being made in terms of upstream-downstream synchronized planning, which is fundamental for the existence of a river whether it is major or minor, as it affects the flow of water irrespective of its stretch.

Comparison of minor rivers to major rivers:

In ancient times, rivers were considered sacred, and so they enjoyed the position of goddesses. Due to the abundance of water, they were not included in governance. During the colonial times, they were mostly used for irrigation purposes. Therefore, the purpose of rivers was limited to fulfill the needs of the people. This pattern continued, and slowly the major and minor rivers both became the source of exploitation. While exploitation of rivers continued, the central government realized the increasing depletion of major rivers. Consequently, the government began making policies, programs and schemes to prevent deterioration, including the minor tributaries of major rivers in them. But unfortunately, several minor rivers remained aloof from such schemes and programs. As a result, they were severely oppressed in terms of policies, schemes, programs, and culture and cartography which decreased their scope for representation.

These three issues have made the "subaltern" rivers being recognized only as a drain (*nallah*). This drain helps politicians to manage the population that has migrated from villages to the city. This population[13] finds a place to stay near the unoccupied space of these rivers, which is mostly non-perennial during the

[13] The littoral residents

eight months of the year. The local leaders fulfil the basic needs of these residents so that they can become their vote banks. This shows not only the "subaltern" nature of the river but also the littoral residents staying near these rivers. Therefore, the idea of control is practiced in such a way that if the river remains a drain, it has its value and is of interest to those who can locally control both the river and the people. That is the reason why "subaltern" rivers suffer more leading to popular recognition of such rivers as drains though on papers they are recognized as local rivers. The academic discourse related to "subaltern" rivers also remains restricted to pollution studies. Mostly the discussions related to their social, cultural, political, and environmental importance do not take precedence in major academic discourses. Categorizing such rivers as "subaltern" is imperative so that their inclusion in various studies and governance could be possible and such deterioration and disappearance of each minor tributary river could be a warning bell for the disappearance of major rivers.

Explaining the idea of governance of rivers in India

Closely related to the discussion on subalternity and complex systems is the focus on river governance in India. This chapter emphasizes on the necessity of a discussion on the methods employed for the governance of water. It has been observed that such issues are debated/brought up in the global scholarly discourse on water governance. In 2000-2002, the governance of water became central theme and category. Three major events are crucial to this development: (i) Second World Water Forum in Hague in 2000; (ii) The Bonn Freshwater Conference in 2001; (iii) The Johannesburg Summit on Sustainable Development in 2002. The three events questioned the nature of the current 'water crisis' and collectively concluded that it was the consequence of a "crisis of governance- not one of scarcity[14]". Since then, governance has become an important feature in global water discourses (Mishra, 2010). This

[14] From the No Water No Future speech of the Johannesburg Summit by the Prince of Orange of the Netherlands (Mishra, 2010).

study takes the idea of 'crisis of governance' of water resource management as its point of departure and extends its applications to the governance of rivers in India. The thesis argues that the present status of dying rivers can be partially attributed to the lack of proper governance and misplaced strategies of managing the water resources, especially the missing rivers and their numerous nameless tributaries.

The chapter emphasizes the importance of technical as well as ecological contexts in the governance of rivers. This is based on theories of environmental sociology in order to explain the daily governance of "subaltern" rivers in India. Earlier on, this chapter discussed the unsuccessful attempts of the government in dealing with the problem of deterioration of rivers in India. This observation has been substantiated in the work of Scott (1998). From Scott's reading, it has been realized that the state-engineered grandiose attempts are but examples of failures of water governance. The question that arises, however, is whether a workable solution is possible. The possibility of a solution summarizes the course of the thesis.

Moreover, technography as a conceptual framework has been used to analyze these social interventions in the form of projects, schemes, programs as well as the various actors involved in (re)shaping the governance of "subaltern" rivers in India. The critical conceptual vocabulary of technography includes life phases, dominant and counter-discourses, technologies of water control and strategies of (re)appropriation (Bolding, 2004). These conceptual notions help in the evaluation of the effect of technological interventions. Ecological and social challenges can at times present a degree of complexity which can only be resolved with an appropriate conceptual framework. Such a framework can help us understand human water interaction better in a specific social setting. This approach measures the impact of intervention between the river, technology, and society in a particular area.

1.1 Objectives of the study

The main objective of this study is to explore the types of (socio)technical interventions that are used in the governance of "subaltern" rivers. It explores the circumstances under which the "subaltern" rivers become the sites of such interventions and how they affect the homeostasis of these rivers.

It also attempts to highlight social, cultural and political factors and emphasize their role in river governance compared to the existing literature which mostly documents the levels of pollution using chemical and biological components. The study explores how 'quick fix' solutions employed by the government affect the overall ecology of the river and the necessity of the use of such solutions.

1.2 Main Research Question and sub-questions

To fulfill these objectives, the thesis is structured in the following way. The primary or the main research question of this study is: **"**what kind of political processes lead to specific technological interventions and how do these technological interventions, in turn, affect social, political and ecological conditions of "subaltern" rivers**?**" Alongside, the sub-questions that this thesis attempts to answer are: why are minor tributary rivers disappearing in India? What factors are responsible for (mis)governance of "subaltern" rivers in India? How do these factors collectively and individually affect the river governance processes?

1.3 Rationale of the Study

As mentioned in section 1.1, an important objective of the study is to highlight the role of social, political and cultural factors which influence our understanding of rivers. The view taken is that an awareness and discussion around such forms of social and cultural discourse can help us envisage better

the homeostasis[15] of the river and what it means to the people who are influenced by it.

Table 1: The cultural importance of the rivers in Hindi cinema

Sr. No.	**Cinema (year)/ Album**	**Lyrics of the song**	**English Translation**	**Context**
1.	Baiju Bawara (1952)[16]	*"Tu Ganga ki mauj mai Yamuna ka dhara"*	You are Ganga's waves and I am Yamuna's flowing water	The confluence of two rivers is sacred and is considered to be the greatest love of all.
2.	Jis desh mei Ganga Behti Hai (1960)	*"Hum us desh ke vaasi hai"*	We are the citizens of that country where the river Ganga continuously flows	Rivers are the defining feature of India.
3.	Kabuliwala (1961)	*"Ganga aaye kahan se Ganga jaaye kaha se"*	Ganga where do you come from and where do you go?	Rivers do not discriminate amongst the diverse regions where it flows in India

[15] Maintaining the internal stability of the river (Thesaurus)

[16] The songs have been chosen from the year 1952 to 1971 just in order to emphasize on the cultural importance. It is only an example to show various roles of the river in the lives of humans.

4.	Ganga ki lehren (1964)	*"Humare sang sang chale Ganga ki lehren"*	Ganga accompanies a human as a friend in a journey called life.	Rivers act as friend for the people who are dependent on its water in India.
5.	Chandan Ka Palna (1967)	*"O Ganga Maiya Paar Laga de"*	Oh; Mother Ganga rescue us from the miseries	Rivers are given the status of "mother" who rescues her children from miseries.
6.	Ganga Tera Paani Amrit (1971)	*"Ganga tera paani amrit"*	Water that flows in river Ganga is nectar	Rivers are considered to be carriers of nectar
7.	Bhupen Hazarika (Album)	*"Bistirno dupare"*	The massive wide stretch of river Ganga	Travails of Ganga as it witnesses oppression and poverty.

Perhaps no other cultural medium has made as important a contribution to a discussion on the depiction of the Ganga or rivers in popular culture as cinema[17]. Few examples have been mentioned in Table 1. An emphasis in the popular cinema on rivers like the Ganga reveals that it remains an important cultural priority for the Indian people. Perhaps the frequent references to the

[17] This study has mostly chosen Hindi cinema because the native language of the author is Hindi.

Ganga in popular culture is an acknowledgment of her philosophical significance in the everyday lives of the people. In table 1 songs on rivers have been used as an example to emphasize the roles that the river portrays in the lives of people. Rivers from ancient times have taught humans the bond of friendship, love, and harmony, and they have acted as a friend, philosopher, guide and a lifeline for the people of India.

Even today, rivers are the resource which provide humans food and occupation. Of late, this role of the river has been ignored. Degradation of the river shows how its cultural importance has also diminished. In the past, rivers proved great centers of cultural practices: they were centers for meditation for religious leaders, in Hindu religion many practices were involved related to rivers like marriage ceremony, *mundan sankar*, *janeoo sanskar*, and funeral rituals. These practices have transformed today but references are found realated to major rivers and very partially for minor rivers. Folklores, songs, and tales of minor rivers have been passed on from generation to generation only through word of mouth. Hence not much is mentioned or discussed about them in popular arena in the form of written text. There has been a decline in the connection with the minor rivers that people had in the past, which has led to a change in the cultural practices thereby, reducing the importance of such rivers and causing minor rivers into sewage dumping sites. The ethnographic discussions further on will highlight, the reasons for the transformation of the river into a sewage. Using the example of cultural reference of the Ganga, this thesis highlights that rivers, in general, teaches humans how to live, they are considered to be sacred and divine due to their power of remission of the sins in seeking salvation. Therefore, in Indian civilization rivers are not just a resource but they are an epitome of emotions and values, nourishing human lives with there waters whether they are major or minor.

The discursive distance between the ‘popular’ and the ‘academic’ can often be a difficult terrain to navigate. However, the nature of this study is such that it is essential for the researcher to traverse both terrains. The popular culture

makes us re-think, re-assess and re-evaluate the glories and pitfalls of the past and their content and their application today, and also in envisioning the future (Singh, 2009). In other words, rivers can be perceived as the perennial source of a flowing thought processes that links the past, analyses the present and projects the future of humans and their application. Table 1 included in this study helps to explain the cultural importance of rivers and their embeddedness in practices which require consideration before a technology is invented. This gives a greater scope of the challenges at hand when conceptualizing the social world of the river as well as its cultural centrality in the lives of the many millions who depend on it for their sustenance.

Irrespective of the cultural importance that the rivers hold in our lives, in the academic discourse, there are important set of papers which discuss the increasing pollution of the rivers. For instance, Chakravarti et al. (1965) reported that the quality of water of the Ganga was deteriorating as the river received waste water from a number of sewage drains. Similarly, Saxena et al. (1966) highlighted changes in the chemical quantity of the Ganga at Kanpur. He concluded that in discharging large amounts of effluents containing organic wastes and heavy metals, the tanneries significantly increased the pollution level of the river. In another vein, Agrawal et al. (1976) studied the bacteriological pollution of the Ganga and concluded that the addition of untreated waste and sewage was responsible for the presence of pathogenic organisms. These posed a dangerous threat to the residents of Varanasi.

Studies on river pollution are not only confined to the Ganga but also to its tributary rivers. The CPCB report (2000) on the Yamuna revealed that the water consisted primarily sewage and waste matter. After investigating the anerobic condition in the river, they observed the presence of masses of rising sludge from the bottom and gas bubbles, as well as floating solids on the surface. Kitching (2015) mentions in an article that even though the water of the Chambal was cursed and was too dangerous to traverse due to bandits who terrorized locals with violence and robberies, has also become polluted today.

The river is facing threats from humans like industrial fumes, raw sewage being dumped everyday into the river, thus affecting the rare species found in its water like variety of birds, crocodiles- like gharials. Gupta et al. (2014) conducted a study on water quality management of the Kshipra. They concluded that the water is in a pathetic condition due to its severely reduced flow and mixing of wastewater more than its assimilative capacity. Similarly, Purohit (2015) also conducted a study on pollution in the Kshipra. He concluded that the discharge of waste into the river and the lack of a proper system to address waste disposal in Ujjain have lead to its deterioration. Furthermore, Rao et al. (1978) through a biological assessment of pollution of the Khan, disclosed that the river contained polysaprobic zones (heavily contaminated water, one of saprobic levels given by Kolkwitz and Marsson). Dwivedi et al. (2015) studied the physiochemical parameters of the Khan and his results indicated that the turbidity, chloride, total alkalinity, BOD, total hardness of the water of Khan is 3 to 5 times higher than standard values. Most Probable Number (MPN) value of Khan is 300 times higher than the standard value which affects the aquatic flora and fauna adversely. The study hence suggests that water of Khan is highly polluted. A few literatures discussed in this section express that elite, as well as "subaltern" rivers are severely affected by pollution. The increasing pollution in the "subaltern" rivers is an additional accumulation of contamination in the major rivers. However, the increasing pollution of the rivers regardless of their status not only require physical, chemical, and biological understanding, but also greater research and development capacity in social sciences to help understand the reasons behind the river pollution. Therefore, this study highlights that there is a necessity to explore society, its rivers, and technological interaction before dealing with the deterioration of rivers.

The literature review (which will be discussed in detail in Chapter 3) suggests that the governance of water resources have not considered the socio-technical complexity while constructing critical projects, due to which the rivers have suffered. The concept of socio-technical interaction was established to stress

the reciprocal interrelationship between humans and machines and to bring society and technology together in a "socio-technical system" (Ropohl, 1982). This process was complex because it had to describe both the social and technical phenomena in humans as well as machines, i.e. in the form of technization of society and socialization of technology. Socio-technical complexity is studied from the social sciences perspective to explore the interrelationship between rivers, society, and technology. The next section discusses the location of the study where socio-technical interventions will be analyzed.

1.4 Location of the Study

This section bases its study from the Ganga River Basin in relation to the Kshipra and the Khan which are the "subaltern" rivers.

Map 3: The yellow portion shows Ganga River Basin[18], the portion marked in black is Kshipra River Basin.

1.4.1 Ganga River Basin

The Ganga River Basin is spread over 860,000 sq kms and comprises of 11 states and 17 major tributaries which include the Yamuna, the Kosi and the Chambal (WB, 2015). One of its major tributaries is the

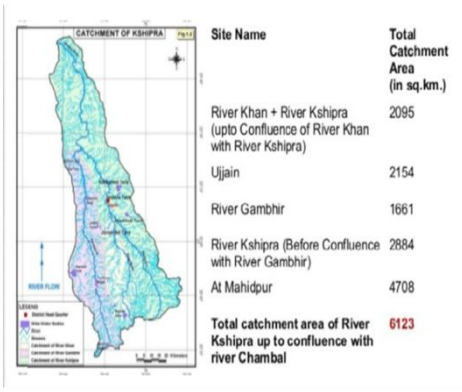
[18] (SA, 2011)

Chambal, and the basin of this river is divided into three parts- upper, middle and lower. The Upper Chambal Basin comprises the Kshipra river Basin (shown in Map 1). In Map 3 the portion highlighted in black near Indore shows the catchment area of the Kshipra River Basin.

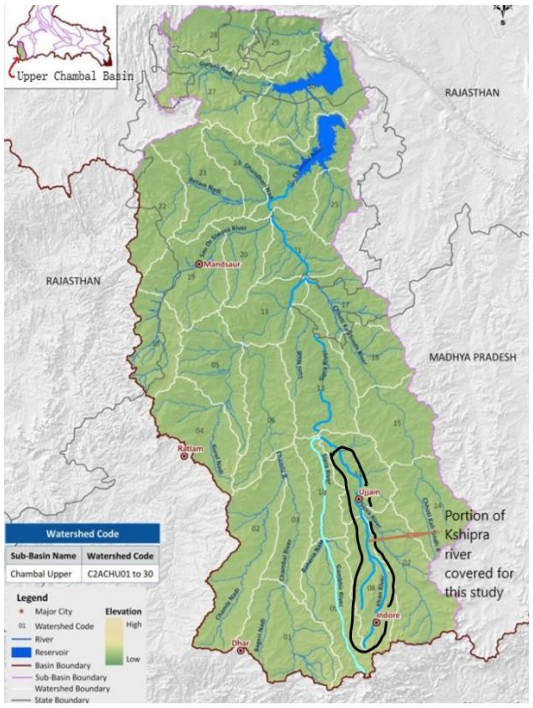
1.4.1.1 Kshipra River Basin

The Kshipra River Basin is located at the southern tip of the Ganga Basin. The basin has a catchment area of 5600 sq km. The Kshipra originates from the Vindhya Ranges of Malwa region and flows northwards for 195 km to merge with the river Chambal at Ismailganj village of Ratlam district in Madhya Pradesh, India. Some sources opine that the river begins from Parijat Hills in Kevadeshwar at the outskirts of Indore city. Of the 195 kms that it covers, 93km lies in the holy city of Ujjain alone. Although Ujjain finds a place among the seven sacred pilgrimages in India (Morgan, 1953, p.189-91), the Kshipra does not make it to the list of the seven sacred rivers. Infact it does not even find mention in the maps of the Ganga basin. The reason behind this may be because geographically the major rivers (elite rivers) are considered to be representing the minor ones, i.e. the "subaltern" rivers. The usage of major rivers to represent the "subaltern" rivers can be the reason of the neglect of these rivers at the policy level.

Further, the tributaries of the Kshipra are mainly the Khan and the Ghambhir (also Sarasvati) meandering through the commercial city of Indore before meeting the Kshipra at the Triveni Ghat near Ujjain as shown in Map 4.



Map 4: Kshipra River Basin and its catchment distribution



Map 5: Highlighting Kshipra and Khan rivers in an expanded map[19]

From this basin, the Khan (also Sarasvati) and the Kshipra flow in the city of Indore and Ujjain respectively. The Kshipra is considered to be the "Ganga of Malwa" the *Simhasta Kumbh Mela* is celebrated on its banks every 12 years. The sacredness of the Kshipra does not, however, make it free from pollution.

[19] Source- India-WRIS

The pollution is mostly caused through its tributary Khan. The total area covered by the Khan is 78 km (of which 33 kms are in the city of Indore). Alarmingly, the sewage discharge in the Khan has reached 275 MLD and the sewage treatment plant in Indore at Kabit Khedi only has the capacity to treat 90 MLD of sewage.

Both the Khan and the Kshipra have dried up due to over-extraction of water from these rivers as Indore and Ujjain cities have expanded on their banks. Both the rivers are facing deterioration due to deforestation and construction of buildings along their banks, besides the continuous discharge of industrial effluents and domestic sewage. The intensity of pollution has led to Khan falling under priority I of polluted rivers and Kshipra in priority II (CPCB, 2015). Priority I refers to highly polluted, and priority II is for those rivers which are less polluted. The Kumbh Mela of 2016 witnessed the Madhya Pradesh government's attempts to clean the river Khan which later forced them to divert this river through pipeline for 19.5 kms to keep the Kshipra clean. This project was named Khan Diversion Project (discussed in detail in Chapter 5).

The Kshipra currently has no water of its own. So, The government planned to link the Kshipra with the Narmada through a pipeline and called it NKSLP (discussed in detail in Chapter 2). Through this project, the government fulfilled the water consumption requirement of the 5.50 crore (FP, 2016) people who came to take a holy dip in the Kumbh Mela of 2016. The Kshipra covers a smaller stretch compared to the Ganga, but it enjoys an exalted position in Hindu mythology. It is one of the four rivers that hosts the grand bathing festival of Kumbh Mela, alongside the Ganga, the Ganga-Yamuna confluence, and

the Godavari. The scholarly literature often ignores this context. For instance, Sanyal (2012) and Aitkins (1992) refer to the seven sacred rivers which are the Ganga, the Brahmaputra, the Narmada, the Krishna, the Kaveri, the Godavari and the Sarasvati but ignores the Kshipra. The seven rivers that they have talked about have been widely studied and discussed due to the popular perception that there are only seven sacred rivers in India. This notion has left behind many more sacred rivers which maybe small but have held a crucial position in the development of the towns and villages around them.

Looking at the map of rivers in India, it is found that smaller streams go unnoticed. For example, Map 2 shows Kshipra reaching Indore and mysteriously being renamed Chambal river. In Map 1, it is noteworthy that the Kshipra River Basin has been subsumed and labeled as the 'Upper Chambal Basin'. A similar observation applies to the Khan (which is the tributary of Kshipra).

It has been argued that such disregard and neglect of smaller rivers by only mentioning them as 'Upper Chambal' or 'Chambal' underplays their importance and status in Indian society. Its non- appearance in the map of India makes people unaware of these rivers, and the pollution and release of industrial and domestic wastewater continue unabated into all such rivers by taking advantage of this veil of obscurity. If all the smaller rivers from the Ganga are taken as one, and the pollution caused, combined; it will indicate the extensive levels of pollution for the Ganga as well. To clean the Ganga, all the smaller rivers have to be cleaned first. The next section discusses the main findings. This section discusses the

observations which are provided in each chapter while studying the two "subaltern" rivers.

1.5 Main Findings

As a catalyst to the discussion on "subaltern" rivers, this study highlights the patterns of degradation and the mechanism through which it is governed. The emphasis on the "subaltern" river begins from chapter 2. It provides the background of the "subaltern" rivers and how the status of these rivers changed after industrialization. The chapter highlights an alienation[20] between nature and humans as the chief reason for the deterioration of "subaltern" rivers, especially, in developing cities like Indore and Ujjain. The next chapter, details the reasons for the collapse of the environment with the help of governance of rivers in India, by explaining the practices of managing water using the ancient texts. These texts are used to explain that in ancient times, the focus of governance was on the management of water and not on the river**.** In the colonial period, the focus changed to the exploitation of water resources by having complete control over it. The emphasis during this period was to expand irrigation practices so that agricultural production can be increased. Further, in independent India, the emphasis still was on irrigation with the establishment of other industries on the banks of the river. The industries expanded with the result of their waste being disposed into the river thus causing its deterioration. Therefore, the government of India since 1985 has tried to solve this problem of deterioration of the rivers through socio-technical interventions, but which in turn only aggravated the problem.

Furthermore, in chapter 4, the study discovers that the drawbacks of socio-technical interventions have aggravated the situation of the deterioration of rivers. Subsequently, chapter 5 analyses these socio-technical interventions

[20] Marx provides, a cautious constructionism, fully in tune with his own practical materialism, which always emphasized the role of human practices, while remaining sensitive to natural conditions, evolutionary change, and the metabolic interaction of humanity and the earth. Lack of sensitivity towards nature leads to alienation of humans from nature (Foster, 2002)

that have taken place as far as banks of “subaltern” rivers cover their course. This chapter, discloses the fact that socio-technical interventions give rise to socio-technical complexity, which can be understood through technography. Once the complexity is understood it could be reduced through alternate methods suggested in this study so that failure of interventions could be minimized.

The penultimate chapters highlight the critical importance of “subaltern” today. The chapter emphasizes the role of all stakeholders in understanding “what kind of interventions are brought by the government in the name of sustainability and are such projects helping people?” It is argued that at present, people have to understand the implications of the technology and its effects on rivers. It is important to address the concerns of “subaltern” rivers to save the tributaries of major rivers from disappearing.

1.6 Structure of the Thesis

This dissertation is divided into six chapters to provide reasons why minor tributary rivers are abandoned and they lie decaying in the backyards of the cities.

Chapter 1 has six sections. The first section provides the two concerns of the study: 1) why are minor rivers “subaltern”, 2) the governance concerns the reasons of the smallest tributary rivers of the major rivers becoming “subaltern”. The second section, provides the objectives of the study. This section is followed by the third section which deals with the main research questions and sub-questions. Further, the rationale of the study is discussed in the fourth section of this chapter which builds a relationship between the cultural importance of the rivers and the changing status of both the major and the minor rivers in India. The fifth section of the study provides the location of the area with the help of maps illustrating the rivers in India. The sixth section provides the findings of each chapter of the study, and the last section elaborates the structure of the thesis.

Chapter 2 opens with the background of the study. This chapter, studies the changes in the status of "subaltern" rivers. It further elaborates the events that transformed the river into a *nallah* and how these events aggravated its critical condition. This chapter is divided into two sections: the first section details the history of the Khan and the cause which increased the amount of sewage flow into the river. This section is further divided into three parts a) water supply system of Indore city, b) slum sprawl on the banks of Khan, and c) the cleaning projects of the Khan. The second section details the holy status of the river Kshipra and its present status. It also provides the details of the attempts of government to clean the Kshipra.

Chapter 3 highlights how rivers have been governed in the past. This chapter has been divided into two parts: first discusses the governance of rivers in India by going back to ancient times and then coming back to independent India. It provides the details of the diversity of the scholarships that have focused on major rivers. The second part provides the details of governance of "subaltern" rivers in Madhya Pradesh and highlights the scholarships emphasizing only on pollution. The objective of this chapter is to provide a review of the literature. With the help of the first three chapters, the thesis emphasizes on the effects of the socio-technical intervention on "subaltern" rivers which in turn affect the major rivers. This part further leads to the second where this thesis provides the ethnographic details of the field and further explains the current situation of the "subaltern" rivers.

Chapter 4 introduces the theoretical framework and analytical approach to technography. It conceptualizes the idea of technography and describes the components through which it can be operationalized. Using technography, it expresses the drawbacks which have affected the "subaltern" rivers so far and how can they be minimized. It also provides the methods used in this study to bring in the field data to the academic platform. Further, it analyses the study using technography and explains the impacts of the projects like NKSLP and

KDP on minor rivers. The next part of the thesis, discusses the analysis of the field data using the theoretical and methodological framework of the study.

Chapter 5 is an analytical study, where the objective is to use the theory and the conceptual framework presented in Chapter 4. This chapter presents the status of the "subaltern" rivers and illustrates how these rivers benefit people even after becoming a *nallah*. To address concerns related to the environment, theories of environmental sociology have been used (risk society, social inequality, differential rent and so on) to elaborate the understanding of the areas covered in Indore city on the banks of the river Khan. It also discusses the Khan Diversion Project in the villages at the outskirts of Indore and Ujjain cities. Specifically, It discusses the socio-technical interventions which have affected the farmers in the region. Scott's (1998) theory explains the state's intervention and discusses how initiatives of administration affect the situation by using highly modern techniques. Also, it elaborates the fieldwork experience of Kumbh Mela celebration on the banks of Kshipra. It is seen through a perspective of the deterioration of the Khan affecting the Kshipra during a ritualistic bathing. This part elaborates the way the Kshipra has been perceived by the religious leaders, the administration, and the people. It also conveys how such festivals have been commercialized and exploited. The administration with its slogans on ecological welfare is not in fact concerned about the environment. Using this part explains the ground realities of the projects which have been launched on "subaltern" rivers. While the next section uses the conceptual framework to determine which particular interaction amongst river, society, and technology is tailing in the study area.

The final Chapter (6) studies, the conditions of "subaltern" rivers that speak for themselves based on the arguments made in the previous chapters. This chapter provides the main observations and articulates the conclusion of the study. It expresses the necessity of "subaltern" rivers in our lives. It further provides suggestions and recommendations to emphasize the governance of

rivers in India. This chapter also provides limitations of the study and scope for future work.

Chapter-2: Background of the study

This chapter is a historical narrative of the Khan and the Kshipra rivers flowing in Indore and Ujjain districts of Madhya Pradesh. It explains the effects of industrialization on "subaltern" rivers like these. This thesis argues that the two rivers have played a significant role in the establishment of Indore and Ujjain. This aspect has been explored in two parts. The first part traces the events leading to the establishment of Indore on the banks of the Khan and the second part highlights the changing influence of the Kshipra in Ujjain.

2.1 Origin of Indore city on the banks of Khan river

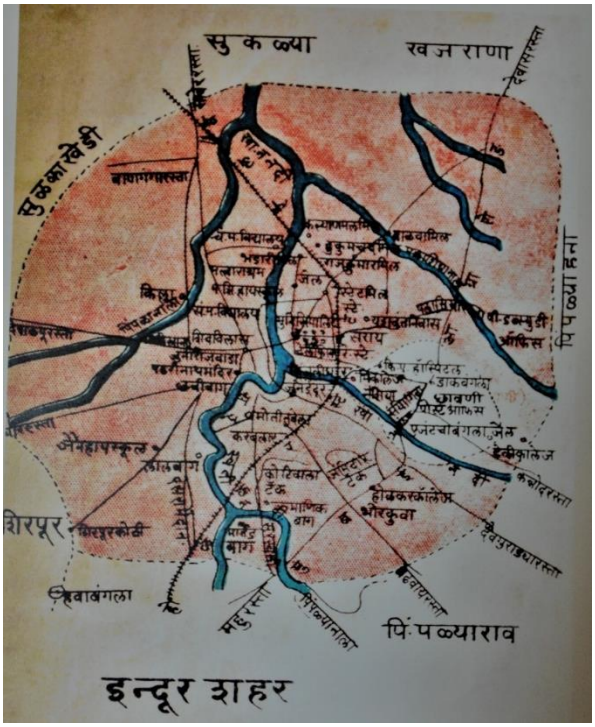
The city of Indore is 300 years old, originally an army camp (ACCRN, 2009, p.6). The first detailed description of the urbanization of the city can be found in the celebrated account of Hamilton (1828) that described Indore as "a city in the province of Malwa, the capital of the Holkar family". He further noted that the city had been rebuilt as an "entirely modern" settlement in 1801, after a disastrous fire.

> "Since 1818 the city has been extending with such a pace that its population, which at the time of Sir Thomas Hislop's army, was only 10,000, two years later it was roughly computed at 60,000. Not only had those families which, during the fire, had fled to Oojein (Ujjain), returned, but also the inhabitants of Oojein and its vicinity were migrating in large numbers to Indore. The city consequently witnessed a spectacle not uncommon in England, but rarely to be seen in India, whole streets of new dwelling-houses, being built in every direction, while the revenue in that short space of time had increased fourfold…" (Hamilton,1828, p.7).

Topographically, Indore is in an upland area on the Sarasvati[21] and the Khan, the tributaries of the Kshipra river. It was founded in 1715, as a trading center on the Narmada river valley route by local landowners who named the city after a temple nearby- Indreshwar. It became the political capital of the Holkar

[21] This study covers Sarasvati river but under the name of river Khan, so only when it is necessary to show the distinction then Sarasvati river has been used otherwise the name Khan has been used.

dynasty and retained this status even after the defeat of the Holkars by the East India Company in 1818, but with a change in nomenclature. Post-1818, Indore had the proud privilege of being the headquarters of the British Central India Agency.



Map 6: Indore District 1908 (Gate, 2009)

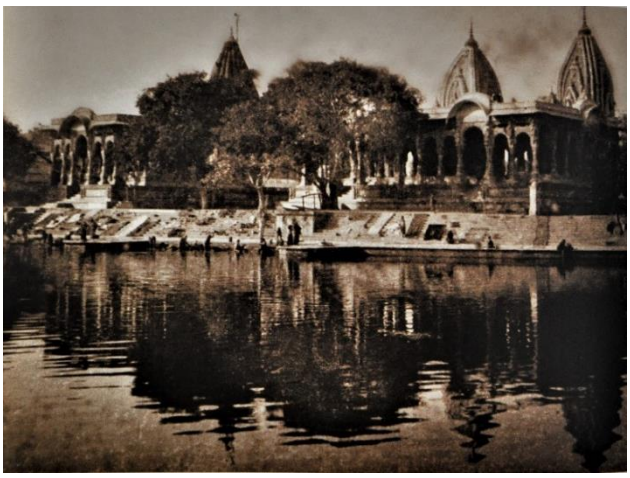
The Khan river originates from a hill near the village Umaria in the Vindhya ranges of the Malwa region (about seven miles south of Indore). The rivulets that feed this river originate in the Ralamandal and Dev-Guradia hills of the Vindhyas. These hills are located in the south-west of Indore district. The Vindhya mountain ranges also feed two other rivulets in the south-east of Indore. These rivulets, in turn, feed the river Sarasvati. The Katkia *nallah* is the major tributary of the Khan, joining at Sanwer. Here a small temple dedicated to the Lord of confluence Sangam-Nath Temple greets the occasional travelers to its areas (Shrivastav, 1971, p.8). In ancient times the Khan was the Holkars favorite commute, the reach of the river which was a confluence of 13 rivers. A typical commute would feature abundant water, beautiful ghats, and greenery. Aesthetics aside, the Khan was also strategically

important as it passed through the Residency, Sukh Niwas Palace, the State Mill and Krishnapura.

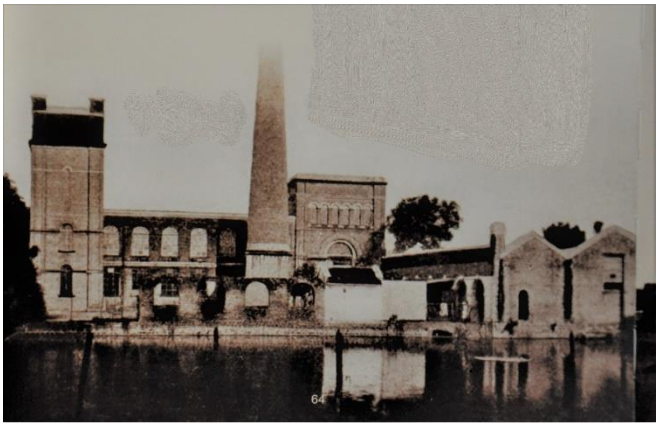
The Khan was also important to contemporary religious practices. This can be seen from the construction of temples on its banks. During the Kumbh Mela, religious leaders and saints would bathe in the Khan before proceeding to the holy city of Ujjain and the celebrated temple Omkareshwar (Singh, 2013). The river also provided drinking water to the royal family and common people alike. The Holkar dynasty constructed 40 dams on this river, so that water after rains could be such in the river till the next rain. Even today, one can see the structure of these dams on the banks of Khan river. The pictures in this section, illustrate their structural complexity and aesthetics.

Photograph 1: River side view of Chhatri bagh Indore around 1907
(Source: Gate, 2009)

Photograph 2: River Khan near the Residency Garden around 1854
(Source:Gate, 2009)



Photograph 3: Group of cenotaphs located at the left bank of Khan river at Krishnapura
(Source: Gate, 2009)



Photograph 4: The State Mill, Indore constructed in 1866 by Tukoji Rao Holkar II on the banks of River Khan (Source: Gate, 2009)

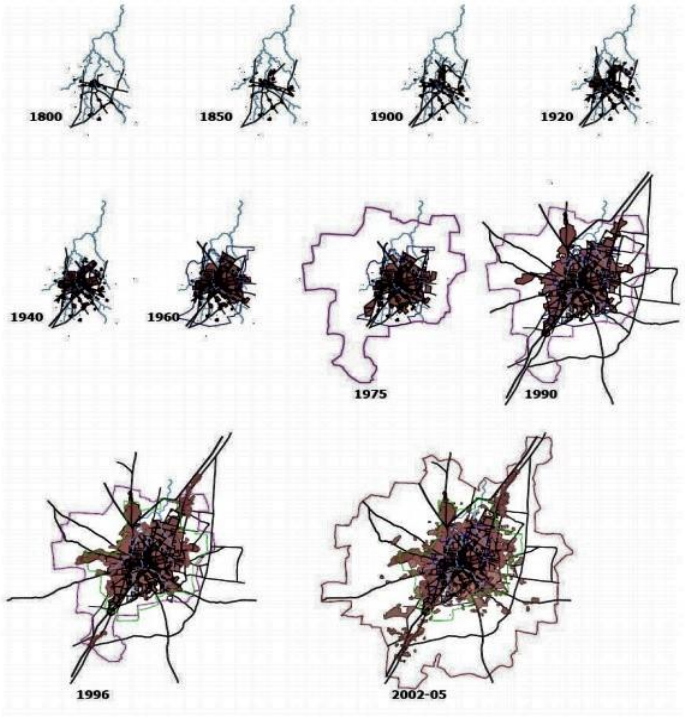
The aesthetics of the Khan has also been a consistent feature in popular culture and cinema. The Hindi movie *Aan* (1952) featured the river in a popular song. Interestingly, the song narrated the commute of a royal princess who used the Khan to travel to a palace on its banks (Nasir, 2009). The next section explains the journey of the Khan as being a beautiful river to an open drain.

2.1.1Change in the status of the Khan

The status of the Khan changed after the British takeover of the Malwa region in 1818. The new colonial masters exported opium and later food grains to other countries to increase their revenue. These crops were amongst the most lucrative business in Indore and led to the development of this city as a business hub (George et al., 1999).

In 1918, in a bid to 'improve' and expand the city, the government invited Sir Patrick Geddes, who prepared various schemes for this city such as industrial development, housing, landscape and water supply (IMC, 2010, p.19). Incidentally, his suggestions were the moving force behind a new plan of carrying the sewage through the pipeline to the outskirts of the city. However, all his suggestion were not taken into account. For instance, Geddes argument that drainage pipelines must be connected to sewage treatment plants fell on deaf ears. In the long run, this has caused ecological damage as the sewage now pours into the Khan without treatment.

The years following Independence witnessed, Indore rising to be of great commercial and industrial importance. The city oversaw an unprecedented influx of major companies such as the Tatas, Hindustan Motors, Ranbaxy and many more (MSME, 2012). With industrial and commercial development, the consequent growth of townships began to influence the distribution of the population in the city. However, this also had consequences for the ecological welfare of the Khan. The river was now exploited to facilitate urban expansion.



Photograph 5: Spatial growth pattern of Indore on the banks of River Khan

Photograph 5 illustrates the important trends relating to the period in which significant expansion of the city took place. Although urban expansion can be traced since 1800, substantial increase only occurred after 1990. This urban expansion reflects the status of Indore as the most prominent city in Western Madhya Pradesh. The city has always enjoyed unparallel employment avenues but being surrounded by underdeveloped hinterland has had seasonal scarce labor demand (ACCCRN, 2013). The present planning area of the city is 504.87 sq km. It was 107.25 sq km in the year 2002 (ICDP, 2012). The census data suggests that the population of the city in 2001 was 1.47 million (Census, 2001) which increased to 1.96 million in 2011 (Census, 2011). Based on the estimation (India Population, 2017) the population is expected to rise to 4 million or more.

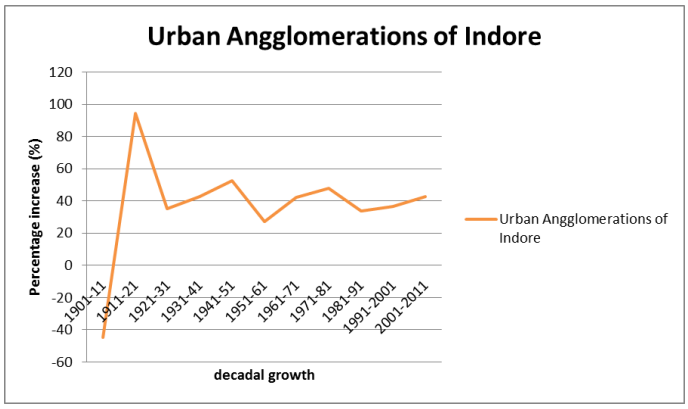


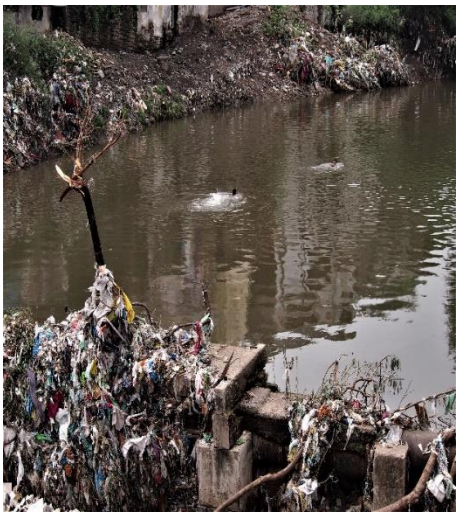
Figure 1: Percentage increase in Urban agglomeration in Indore city (COI, 2011)

The effect of population growth is such that, the Khan (with a catchment area of 2 lakh acres) receives the bulk of the discharge from domestic and industrial wastes. Close to 110MLD of sewage from Indore city and 70 MLD of industrial waste has been added to the river every day since 2011 (Sharma et al., 2011). According to a recent study of IMC, the daily volume of sewage discharge from Indore has increased to 275 MLD. It is expected to increase to 335 MLD by the year 2020 (Dhar, 2017). Therefore, the discharge of waste has been increasing at an alarming rate.

The primary reasons behind the increase in the discharge of waste is that a range of industries- textile, mills, chemicals, pharmaceuticals, electroplating, paper mills, food processing, etc are located on the banks of the river. This has led to large sections of the population deal with dependent unhygienic disposal system. Even partially treated effluents from septic tanks, flow into open drains (along with other untreated sewage). The waste then directly flows into the river through the toilets. There are about 1,465 public toilets constructed in the city attached to the septic tank, but most of them are poorly maintained. This means that the resulting sewage generated has been directed towards the Khan. In 2009, the CDP reported that 5% of the population continued to defecate in the open, near the banks of the Khan

(ACCCRN, 2013). Unsurprisingly such activities have led to a deterioration in the quality of groundwater in Indore. For instance, a study conducted by the IMC concluded that 94% of the groundwater of Indore was polluted because of excessive pollution caused in river Khan (Tiwari, 2016).

Photograph 6: View of river Khan near Sanjay Setu



Photograph 7: View of river Khan river near Rambagh

Photographs from 1 to 4, and 6, and 7 show a stark difference in the status of the river between 1913 to the present day. Today, a network of 540 pipes pour sewage into the Khan river (Singh, 2013). It's hard to concede that the water which was used once to perform rituals has

been converted into a sewage. Recently, the city installed a sewerage treatment plant (STP). It is located at Kabit Khedi with a capacity to treat 90 MLD of sewage on Upflow Anaerobic Sludge Blanket (UASB) technology and was commissioned in 2007. This plant has been installed under the aegis of the National River Conservation Development Plan (NIPFP, 2006). However, only 55% of the population have access to sewerage networks connected to this STP. The rest have to contend with waste being directly poured into the river due to lack of connecting pipelines reaching to the sewage treatment plant. There are also concerns related to maintenance of this STP (ref to. Dhar, 2017; BS,2015; Jha, 2013).

For nearly four decades, the Khan has not had any flow in non-monsoon seasons. Instead, it carries highly polluted sewage. Its maximum dry weather flow is 51.2 MLD. It has been noted that although facility of treatment of 245 MLD is in the offing, it is still under construction. Currently, the Khan is a channel which carries sewage and drainage. It has become a solid, and construction waste dumping site. It is encroached by slums near its banks and has also become a source of contamination for the tributary rivers such as the Kshipra. In the following section, an attempt has been made to explain the changing status of the Khan by explaining the water supply system of Indore city, and also the policies and programs that were created to clean river Khan and manage the slums on its banks.

2.1.2 Water supply of Indore city

The first water supply system used the Khan and the Sarasvati as natural water bodies. In 1894, two reservoirs were constructed in Pipliyapala and Sirpur to supply piped water to Indore. In 1906 after electricity came to the city, a pump house was established on the Bilawali tank, another reservoir, to provide water to the people of the city. Through this tank, extended water was supplied for

implementation of sanitation plan. The first formal plan of sanitation was introduced in 1918 though today it poses a threat to open drains emptying untreated wastewater into the *nallahs* and rivers (Geddes, 1918, p.165). In 1939, Yashwant Sagar dam on the Gambhir river was constructed to fulfill the needs of the increasing population (IMC, 2017, p.123).

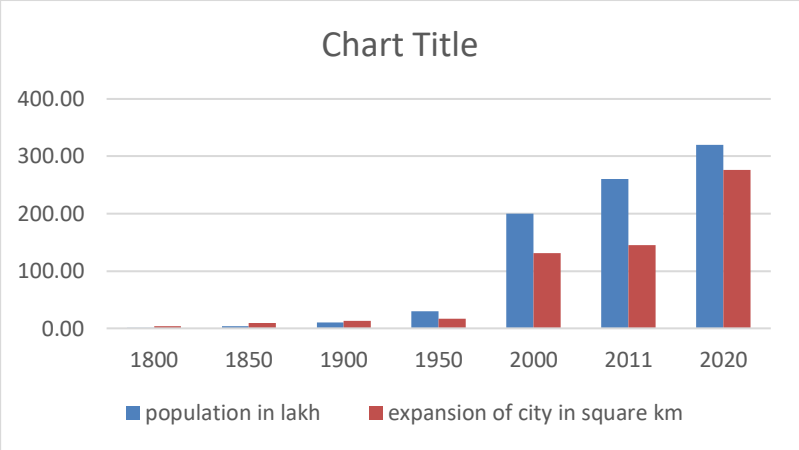


Figure 2: Increase in population with urban expansion

The city of Indore expanded and so did the population (refer to figure 2), hence the requirement of water increased. Water provided by the local supplies from Sirpur, Bilawali and Yashwant Sagar became inadequate. Therefore, a plan to pump water, 70 km away from the Narmada river at a level of 500 meters was drawn. This project was implemented in different phases. The first phase was commissioned in 1978, as the population reached 6.95 lakh. This phase brought 90 MLD of water to the city and was further increased to 132 MLD till 1984 (TOI, 2012). The second phase was commissioned in the year 1990 when the population grew around 11 lakhs. In this year the city and its nearby areas faced water scarcity as the Kshipra, the source of the town's water supply, was drying up and the water table of almost all the handpumps, wells, and tube wells were touching rock bottom

(Singh, 1990). Therefore, this phase drew 223 MLD of water from the Narmada to fulfill the water requirements of Indore city. Even after commissioning the second phase of water from the Narmada River, water scarcity remained and to accomplish that, another 19 MLD of water was supplied. This increased the total supply to 241 MLD for a population of 16.26 lakh in 1999 (Singh, 1990).

The year 2008 witnessed an acute water crisis that year the city was expecting an annual rainfall of 1,092 mm but received only 517 mm of rain. Encroachments around the water bodies reduced the inflow into them. For example, the biggest locality in the city, Kathiwala tank, reclaimed by filling this waterbody. Another tank, Pipliyapala has been converted into a picnic spot. Over 100 hectares around the tank has been covered in concrete, reducing the water inflow. The Khan and the Sarasvati rivers had already turned into drains by then (Anon, 2011). In the year 2011, again a newspaper reported that, "due to potable water shortage and declining underground table, Indore was declared water scarcity hit district from April to June 2011" (PTI, 2011). Orders were issued by the district collector Raghvendra Singh during this year that, "no one was allowed to dig hand pumps or borewell without the permission of the district administration" (PTI, 2011). Around 355 hand pumps were dead during this year. Then the government commissioned the Narmada Phase III project in the year 2013 (IMC, 2017, p.28) to supply 360 MLD of water to cover the demand of increasing population of 2.6 million (HT, 2016a).

Depletion of water levels left a deep impact on the groundwater table in the surrounding areas. Rivers and lakes, once perennial became seasonal water bodies due to de-silting, accumulation of sewage, waste decomposition, urban expansion, rising temperature and changing patterns of rainfall (HT, 2016a; Dhar, 2017). In 2016, the groundwater level of the city went down by an average of 100 feet (HT, 2015). The

only perennial source of water left for Indore today is the Narmada river. It continues to supply about 360 MLD from the commissioned project of Narmada phase I, II, III but eventually only about 250 MLD reaches the households as distribution losses are high (HT, 2016 a, b; TOI, 2017). The requirement of water shoots up by 1.5 times in the summers every year. Indore with an increasing population of 2.6 million or more, requires 300 MLD of water only for its personal use. For industrial and commercial purposes an additional amount of 100MLD of water is required daily and this is fulfilled through tankers (HT, 2016a; b).

Therefore, it can be observed that all the water bodies available in and around the city have been overused to fulfill the water requirement of the people and also the other cities nearby like Dewas and Ujjain. Even the phases of supply of water from the Narmada has reduced due to excess of water extraction, and because of very little possibilities of water percolating in the soil, the groundwater table has gone down. Resulting to which, IMC plies 52 tankers and has hired 110 water tankers from the private supplies to fulfill the water requirement of the 85 municipal wards (HT, 2016b). The people who suffer the most in this process are the marginalized ones of the city. They have to stand in long queues with drums, buckets, bottles, and vessels to collect water from the municipal tankers that are short in supply. These water tankers supply water to the residents every second day and that too for a short period after creating an ugly site at these spots.

This section attempts to point out that Indore and its nearby areas have overused water from all possible water bodies available in the city and outside. But less initiatives have been taken by the government to save water or recharge water which has led to decrease in water table in this area. So, the huge amount of extraction of water from Khan and Sarasvati have led to these rivers becoming non-perennial. It is

confounding to note that today these rivers have become non-perennial, and are mere carriers of sewage and garbage.

2.1.3 Slums sprawl on the banks of river Khan

Indore is an important industrial, manufacturing, and trading center of Central India. It has a large working-class population, in fact, approximately 28% of the population live in slums (AKAA, 2013). It not only attracts people from Madhya Pradesh, but also from Uttar Pradesh, Rajasthan, Maharashtra, and Gujarat. The reason for people migrating to Indore city is to escape from their extreme poverty, as well as the exploitation of the soil which has led to decreasing rates of agrarian productivity in the villages from which they come[22]**.** Due to their inability to afford homes in various housing colonies in the city, they prefer living in shanty towns built on the banks of river Khan. Agnihotri (1994) in her work, "Poverty Amidst Prosperity: Survey of Slums" has discussed this phenomenon to some extent about Indore, and the growth of slums on the banks of the Khan. She notes:

> "The maximum number of slum districts of the city is characterized by its river location. Out of 85 slums that this book recognizes, 45 had river locations of which 27 were situated along the river, 16 were flanked on either side by road and river, and two slums were enclosed by the river, road and railway line. The river location of slums in the city is the highest in the State".

The present thesis, through fieldwork in the communities of North-toda, Kabootarkhana, South-toda, and Rambagh, has endorsed Agnihotri's findings. Her argument is particularly true with regard to slums in the convergence of the Khan and the Sarasvati in Rajwada, the heart of the city. This region of the city is prone to floods during rains. Such vulnerable places are occupied by slum dwellers due to access to nearby markets and industries. The population of Indore has grown rapidly since 1991, but it's sewage system (built in 1936) has not been able to keep up with this pace. Essential sewage infrastructure, such as

[22] This observation has been made through fieldwork

the absence of underground sewers, has led to the dumping of sewage into the rivers and open channels of the city. Slums, occupying open channels are affected due to sewage. They pose health hazards during the summers as well as in the rainy season. Moreover, during the rains, the river either retain or destroy these slums or harm the shanty towns created by these dwellers. This observation has also been made by Verma (2002) in "Slumming India". Verma discusses various schemes and projects initiated by the government of MP to improve the condition of living in the slums. This section discusses the schemes and programs that have been elaborated in her book.

According to Verma, the very first program was sponsored by the UK government's Overseas Development Administration (ODA) in the year 1985. The ODA provided 183 slums with physicians, health and community development components. In October 1987 the ODA changed its name to Department of International Development (DFID). In 1988, the DFID (with the help of IMC and IDA) launched the Indore Habitat Improvement Project, worth Rs. 390 million to improve 183 slums with 80,000 families. This project also aimed at cleaning up the Khan by eliminating the flow of untreated sewage. Under this project, infrastructure development took place and dustbins, toilets; bathrooms were installed. Improvements such as these made the authorities extend it till the year 1995, and the amount was increased to Rs. 424.5 million. However, as was widely reported in the local press, the project was plagued with cases of mismanagement (Nai Duniya, 1993a). An erstwhile member of the high-level monitoring committee even alleged misuse of funds (Nayi Duniya, 1992).

The newspapers also reported complaints of water-borne diseases from various DFID slums, attributed to contamination of water, due to choking of underground drain installed under the project (Nai Duniya, 1993b). Nai Duniya (1993c) reported that the drainage choked for 50

slums because of engineering defects and the scarcity of water. It also highlighted the risk of water contamination due to water and sewage lines running close to one another in narrow streets of the slums and that an IMC engineer had written to IDA about the same. In spite of this, the project won the World Habitat Award (WHA) in 1994 and was internationally recognized for its 'pioneering work in developing and innovating a successful approach in slum improvement'.

In 1994, slum dwellers alleged inferior quality of work and wastage of funds. For example, underground drains in existing settlements were installed even when the drains were choked. Ironically, even as the problem of chocking drains started to pose major health hazards, the project was widely appreciated (Nai Duniya, 1995b). Due to international appreciation, the duration of the project was further extended to 1997 and the funding was raised to Rs. 605 million. In the year 1995, 183 slums suffered from an epidemic of malaria, attributed to the squalor resulting from chocked drainage (Nai Duniya, 1995). The newspapers reported on mismanagement of funds but to no avail (Nai Duniya, 1995b).

In the summers of 1996, the project 'beneficiaries' complained that the choking led to a shortage of water, flash floods, and permanent damage to their homes. They also complained about shoddy project infrastructure and inadequate quality of IDA's work (Nai Duniya 1996a, 1996b;1996c). Two-thirds of the houses in the slums had not connected their drainage to the pipelines, and their sewage was either flowing on the roads or into the river. But Diacon (1997, p.38-41) mentioned about the river cleaning process through slum networking under this project in the following manner:

"As stretches of the rivers passing through the city center were cleaned of sewage, they were turned into freshwater lakes, and the banks were landscaped. 4 km of the bank has been improved to date. Improvement of the riverbank has now become a continuous process. A further 1-km stretch was

taken up in 1996. The old temples and stone steps along the banks were painstakingly restored. The riverbed was dredged to a grade, and the surplus earth used to widen the banks. The slopes were stabilized by cutting the sides to the natural angle of soil repose and extensively planted… Pedestrian paths and gardens were laid on the banks. As the earthworks and landscaping stabilized short bund walls were built across the bed to retain the water. Thus, in the monsoon times water flows freely over the walls, but in dry summer months, water is retained in the lake formed by the bunds. The city center has thus been transformed into a major recreational area… a beautiful and popular picnic spot for local people. Surveys have shown that groundwater quality in wells near the improved stretches of the river is now significantly better than in those near stretches still to be improved. The cost of carrying out this work has been met by those wishing to provide commercial and recreational facilities on the riverbanks and has placed no additional financial burden on the project. Fountains and lights are being installed and maintained in the lake by industrial and commercial companies. A plan for extending the improvement of the riverbanks to cover the entire city has been developed".

The claims made by Diacon (1997) in his report and the inferences brought through Verma (2002), Agnihotri (1992) and Nai Duniya daily, have contrastingly different viewpoints. Regardless of the reports and critique of the project, the IDA declared it successful in the year 1998, and another project was proposed on commercial development on the riverfront. Around 1500 slum dwellers from Shekhar Nagar, Kabada Market, Ram Bagh, Anna Bhau Sathe Nagar and Chatrapati Nagar opposed this proposal. Despite the protest, IDA sanctioned funds for the riverfront development scheme. However, the draft of this scheme on paper was unavailable (Verma, 2000).

The Indore Habitat Development (IHD) project discussed in this section was to improve the conditions of slums in Indore. This project aimed at cleaning the Khan by eliminating the flow of untreated sewage, but it ended up doing the opposite. Under this project, complaints were reported of water-borne diseases; it was due to contamination of water caused by choking of the underground drain. The choking of drainage was mainly reported due to engineering defects. This further increased the contamination in the Khan, which

further lead to Indore administration launching several other projects and schemes to clean river Khan.

2.1.4 Cleaning projects of river Khan

Further, a newspaper report suggested that in the year 2000-2002 for riverfront development scheme of the Khan an estimated budget of Rs. 350 crore was prepared by the state government and presented to the center under the Jawaharlal Nehru National Renewable Mission (JNNURM). The center sanctioned Rs 113 crore for the same (Jansatta, 2006). The then Mayor of the city-sanctioned Rs. 353 million for sewage treatment plant, but all the sewage and drainage pipelines could not reach this plant, and hence even this initiative could not justify its goal.

The central government again in November 2009 approved a grant of Rs 90 crore for the riverfront development scheme under JNNURM. But in March 2011, this ambitious river-side corridor project to rejuvenate Khan received a setback by the central government (Bhaskar, 2011a). The then City Corporate Commissioner, stated to a newspaper that "the state government is in talks with the center to get the project file cleared. We hope that the file is cleared soon, and the city corporation receives the grant needed for the project" (Bhaskar, 2011a). In April 2011, the center agreed to release the first installment of Rs. 22.50 crore, paving the way for work to begin (Bhaskar, 2011b). This river side corridor project was divided into two parts of construction one of 6.69 km corridor to be built from Tejpur Gadbadi to Krishnapura on the Sarasvati river, the second 7.64 km corridor which was to be constructed from Krishnapura to MR-10 on Khan river. The project comprised of construction of retaining the wall, roads, footpaths, green belts and bus stop on the river banks. Besides, 42 footbridges and 16 bridges were to be built as part of the plan. But

till January 2013 the project was yet to start (ref. TOI, 2013a; FP, 2013, TOI, 2013b).

Before the riverside corridor project could start, cleaning of the Khan became the agenda of the MP government (Chaube, 2014). The Chief Minister (CM) wanted the Khan to be linked with the Clean Ganga project of the central government as the Khan was part of the Ganga basin. The project of cleaning the river included systematic resettlement of localities on the river banks and treatment of water from Polo ground industrial area to Sanwer falling into the river. There was a newspaper report that the CM was to suggest the Central government to help the state government link Khan to Narmada-Gambhir Water Link Project to ensure a continuous flow of water (Pioneer, 2014). In another newspaper, it was mentioned that cleaning of the Khan would take place in two phases, with an estimated cost of Rs 47 crore (News 18, 2014). The first phase included construction of sewage treatment and was expected to be completed before *Simhasta Kumbh Mela*, 2016. The second phase was to chalk out the strategy for the next five years. The then commissioner, in an interview to a newspaper said, "to clean the river Khan,10,000 slum dwellers would be relocated" (News 18, 2014). An elected Member of Parliament from Indore constituency wanted the cleaning of river Khan to be a pilot project so that the cleaning of the Ganga could be possible (Trivedi, 2014). In 2014, both the Chief Minister and the Member of Parliament emphasized that the Khan being the sub-tributary of the Ganga must be included in the cleaning program of river Ganga. Under this initiative, the first phase of cleaning Khan was to be finished by December 2015 (Trivedi, 2014). This way there were newspaper reports discussing the governments initiative to clean river Khan. These initiatives when announced were quite promising but unfortunately could not be implemented. Therefore, a petition was filed by Kishore Deepak Kodwani on the rejuvenation of river Khan and its tributary rivers in the year 2014,

which provided the National Green Tribunal (NGT) play a role in cleaning the Khan.

NGT instructed the Indore Municipal Corporation (IMC) to remove garbage and debris from the riverbed of Khan before November 2014 and submit the report with photographs of removal of debris. In reply to this order, IMC mentioned that "there are around 163 sewerage points on the Khan and to stop the flow of sewerage into the river they have issued tenders and are in the process to set up treatment plants to treat sewerage waters to keep the river clean" (FP, 2014). In 2015, NGT asked IMC to chalk out a month wise plan to clean the Khan and Sarasvati rivers as it found that the progress of cleaning was slow. NGT directed the civic body to prepare three different micro plans for de-silting, removing encroachments and stopping the flow of sewerage in the river (Jha, 2015).

After NGT's order in March 2015, an encroachment survey and demarcation of the river in Indore started (BS, 2015). Around 4,500 encroachments were to be removed by the civic body from the 18-km long river-bed and divert sewage flow into the river from 468 places (TOI, 2015a). At first, 1552 encroachments were to be removed which included 972 residential, 520 commercial and 67 under other categories. Major encroachers had constructed shops on the banks of the river at Yeshwant Road, Moti Tabela, Shivaji Market, and Fish Market. Chandraprabha Shekhar Nagar had 565 houses and was a complete encroachment on the river (TOI, 2015b). The 1000 families from Chandraprabha Shekhar Nagar were relocated to Bhuri tekri, 426 families were against the relocation, so they scattered to other slums (TOI, 2015c). Later the families came back to Chandraprabha Shekhar Nagar and were living again on the banks of river Khan as IMC had given tender for Khan Diversion Project. Currently, the riverfront

corridor project has been attached to the Smart city project of Indore city (FP, 2015).

This section provides the initiatives taken so far to keep the Khan clean. From section 2.1.2 and 2.1.3, it can be understood that there were initiatives taken by the local administration to clean river Khan, but insufficient financial means, societal resistance and lack of coordinative capacity has led to the deterioration of the Khan. Following the discussion on the river Khan, the next section details the account of river Kshipra in Ujjain city. The important thing to note here is the Kshipra is the major tributary of the Khan.

2.2 Kshipra 'the holy river' of Ujjain City

The Kshipra has been considered holy in many ancient scriptures. For instance, *'Skanda-Purana'* in its *'Avanti Kshetra Khand'* chapter 26, describes how taking a bath in the holy Kshipra before one visits Mahakaleshwar temple in Ujjain helps the devotees to overcome their fear of death. In the same scripture chapter 69 describes the Kshipra "beyond comparison" to any other river in India, such has been the might of this river in the past. The description of Kshipra can also be seen in Kalidas *"Meghdootam"* (The Messenger Cloud) in verse-33. Where he calls it a river which emanates cool breeze, impregnated by the fragrance of the lotus on its banks.

Furthermore, from the earliest Puranas to the present-day celebrations of '*Simhasta Kumbh Mela*', Ujjain and the Kshipra are mentioned in the same breath. It means that the conceptualization of Ujjain without the Kshipra is impossible, which is similar to the teaming up of the Ganga and Benaras. The teaming up of Ujjain and the Kshipra has been found superior to the Ganga and Benaras team because of the ancient belief that the Kshipra 'sometimes flows with milk', as described by Abul Fazal in 1582. Hamilton also explains about the heavenly sight of the Kshipra river in his Gazetteer where he concludes that:

> "the most striking scene, however, at Oojein is the view from the Sipra of a noble range of ghats that line its banks, with the gardens containing the chhatri of the Sindia family, intermingling with cupola pavilions, old trees, Hindoo temples, and tombs of Mahomedan saints. Some of the chhatri are really fine monumental structures" (Hamilton, 1828: p.341)

Another myth that floats in the Hindu religion about the Kshipra is that, it is the blood of Lord Vishnu which flowed on the earth when his index finger was severed by Lord Shiva with his trident. Therefore, the Kshipra occupies a prominent place in the Hindu religion and is considered as the "Ganga of Malwa". It has the honor of hosting *Simhasta Kumbh Mela* on its banks in every twelve years. The Hindus consider the Kshipra as one among the four rivers that possess the 'nectar of immortality'; a holy dip in her waters during this religious fair can free a soul from the cycle of rebirth and death and help humans attain salvation.

At present, the status of this river has deteriorated due to deforestation resulting in soil erosion, flooding, discharge of industrial effluents and domestic sewage and increase in human settlements along the river. The tributaries of the river Kshipra, mainly the Khan and Sarasvati meander through the commercial city of Indore and pour all the sewage of the city into river Kshipra. This river was perennial till 1936 as it supplied piped drinking water to the city of Ujjain. As the population increased in the city of Ujjain, the water extraction from the river increased from 1 MGD[23] to 6 MGD in 1952 (Singh and Yadav, 2003, p.17). In the year 1980, a dam was constructed on the banks of the Gambhir river to augment the drinking water supply of another 5 MGD. This year was the year of *Simhasta Kumbh Mela*. The capacity of the dam was increased to 7.5 MGD in 1992, again the year of (*Simhasta) Kumbh Mela*. The capacity of the dam was further increased to 12 MGD in 2004 which was again the year of Kumbh Mela. But in 2016, the government planned to bring water from the Narmada river to fulfill the requirements of the *Simhasta Kumbh Mela*. This shows that the government has attempted to fulfill the water requirement by

[23] Million Gallons Per Day

bringing water from outside sources which are perennial, to fulfill the necessity of ritualistic bathing in Hindu religion.

The bringing of water from various other sources to the Kshipra shows that the ecosystem of this river has undergone stress with each passing day due to excessive groundwater extraction, shorter monsoons, climate change and massive construction and urbanization in its catchment. It continues to receive industrial effluents, domestic sewage and religious waste that are dumped into the 'holy river' every day, which has also affected the flow of the river to the point of extinction and has destroyed the entire aquatic ecosystem of the watershed of this region. In an article on the water quality of river Kshipra using water quality index, the authors conclude that the water quality index for river Kshipra ranged between 36-49 after Triveni Ghat indicating the poor quality of the river water as it flows through the city of Ujjain. This makes the Kshipra water unsuitable even for bathing (Gupta et al., 2012; Nighojkar and Dohare, 2014). In these articles, it can be seen that the Khan and the Sarasvati play a key role in adding pollutants to the Kshipra. One more study reports about the rising pollution in the Kshipra due to the direct discharge of untreated effluents from Bhairugarh dye industries, which possess a serious health problem to several rural communities dependent on this water for their domestic usage (Thoker et al. 2012). In 2013, the situation worsened when a news channel reported several dead fish were found floating on the river bed due to high level of pollutants in the water. In November 2014 the activists of *'Kshipra Bachaoo Andolan'* alleged that the Public Health and Engineering Department (PHED) of the government, in collusion with the farmers was polluting the river by allowing the polluted water from the farmlands to flow into the river.

The government has made very few attempts to clean and protect this river over the years. Due to heavy pollution in the river, the municipal corporation of Ujjain stopped drawing water from Kshipra river in 1990-91. In 1992, a dam was constructed on the river Gambhir near the Kharotiya village, one of the

biggest tributaries of Kshipra located 18km from Ujjain, which now supplies drinking water to the city of Ujjain. In 2013, the PHED of Ujjain Municipal Corporation initiated a sewerage project costing 4.46 crore to prevent drainage water from reaching the river by laying pipelines for about 1.180km. In the wake of the upcoming *Simhasta Kumbh Mela*, and the presence of very little clean water, the government has initiated some temporary measures such as diverting the polluted water of river Khan, banning the drawing of water from the littoral areas of river Kshipra, and some permanent measures such as laying a 47 km pipelines across the Vindhya mountain ranges, scaling a height of 348 meters to bring water from the Narmada to the point of origin of the Kshipra at the Mundla Dosdar and Sonway villages in Indore district.

2.2.1 Narmada Kshipra Simhasta Link Project

The depletion of major water bodies in the commercial cities like Indore and Ujjain are examples of the fact that the Malwa region is experiencing a water crisis (DoPR (MP), 2009). Concerned by the dying rivers in the Malwa region, like the Kshipra, the Gambhir, and the Kali Sindh, and in the view of acute shortage of drinking water in the commercial cities, the Chief Minister (CM) thought of solving this crisis through the Narmada water. The CM in a newspaper report (Trivedi, 2014) said that "the first phase of the project has been completed with an investment of Rs. 432 crores and the state government will dedicate it to the public. We have successfully linked the two rivers (Narmada-Kshipra) in just fourteen months which was described impossible in some quarters".

It is not for the first time through DoPR (2009) report , that the MP government has realised that there is water scarcity, there were phases of water which were already carried out from the Narmada river for instance: the first phase was commissioned in 1978 which provided 222 MLD of water to commercial cities, the second phase in 1990 which provided 241 MLD of water and the third phase was commissioned in 2013 with 5000 litres of water. NKSLP comes under the third phase through which water is provided to the scarce

regions of commercial cities like Indore, Ujjain, and Dewas and more specifically to fulfill the water requirement for the *Simhasta Kumbh Mela* 2016 (Thakkar, 2014). Further, the government wants to link other rivers like the Gambhir, the Parvati, and the Kali Sindh rivers to the Narmada (Trivedi, 2014).

NKSLP is a 47 km long link through which water is lifted from the Narmada river to a cumulative height of 348 meters. It is then released through an exit structure constructed near Ujjeni village in Indore district which is considered to be the origin of the Kshipra River. This link was conceptualized to answer the drought-like conditions of the Malwa region that has been continuing for the last decades (IWMI, 2015).

Photograph 8: Signboard showing location of NKSLP

Photograph 9: Details of Narmada Kshipra Simhastha Link Project

The photographs 8 and 9 are the actual pictures of the visit to Sisliya tank where the pumping station was situated for this project. NKSLP has been constructed to provide water to the Kshipra to ensure a continuous flow during *Simhasta Kumbh Mela* that happens once in twelve years and holds immense importance in Hindu religion. The beneficiaries of this project are divided into various categories: a) domestic water- municipalities and utilities: Dewas City (23 MLD), Indian Institute of Technology Indore (IIT Indore) (4.5 MLD), 331 villages in Indore, Sanwer, Mhow, Dewas and Ujjain blocks (66 MLD), 22 villages in Mhow legislative area; b) industrial water: Pithampur Industrial Area (90 MLD), Dewas industrial area (23 MLD), Ujjain Knowledge City (11 MLD) (IWMI, 2015).

In this project, four pumping stations drew 5,000 liters of water every second, from Sisliya tank which is fed by the Narmada river. From this tank, it has been piped to Ujjeni village of Indore district, through a 47 km long pipeline (Malhotra, 2014). The site of confluence has been designed for pilgrims to take a bath. Due to the construction of this project, the price of the land in Ujjeni has quadrupled (Jha, 2014). Villagers from Sonway, Singuradiya which were living close to Ujjeni village where this river linking has taken place were happy about the project saying *"Kshipra aur Narmada maiya ka milaap… chamatkar hai,"* (the meeting of Kshipra and Narmada river is a miracle) (Jha, 2014). The MP government claimed that this project was the first river-linking project, and from their side, there was no dearth of money for such projects (Jha, 2014).

According to the claims made for this project it was to provide benefits to 250 villages along the Kshipra river and would also recharge groundwater. But simultaneously the government signed the Delhi Mumbai Industrial Corridor for providing 90 MLD from NKSLP so, only 25% of 362 MLD water would be pumped from this scheme (Trivedi, 2013). Therefore, the claims that were made by the government would only be partially fulfilled. For instance, a report mentions:

> "Pipeline project involves pumping through 47 km long pipes that would raise the elevation of water by about 348 meters from Sisliya (228m) to Ujjeni (576m) through pipelines of 1.8-meter diameter. It involves the use of at least 27.5 MW of power. The power bill of this project was estimated to be Rs 118.92 per year as per MP government Public Relation Officer (PRO) power cost would be Rs.9 per kilo liters for the pumping of 362 MLD. If 35% of water were to reach the consumers, just the power cost of the raw water reaching the consumer would come to Rs. 24 per kilo liter. If the cost of maintenance, replacement cost, staff costs for the NKSLP and also the cost of treatment distribution of the water to the consumers is also included then the cost of the water that would reach consumer will multiply. It would surely reach above Rs.50 per kilo liter" (Thakkar, 2014).

Therefore, there has hardly been any assessing of the water that will reach the Kshipra riverbed and if the way pipelines have been laid are considered, there would be huge evaporation losses and seepages into the dry riverbed and aquifers on the path that this project follows. So, only a small fraction, less than a quarter of the water pumped would reach the consumers.

Administrative approval of the project that took place around October 19, 2012, mentioned that the cost of the project would be taken from the Omkareshwar Project Unit II (Thakkar, 2014) which has a completely different purpose and including the cost of NKSLP in this project will affect the beneficiaries of this project. The diversion of water from Omkareshwar canal angered the farmers, and they filed an interlocutory application to the Indore bench of MP high court, asking for a stay on the inauguration of the project. While the High Court did not provide a stay, it remarked that the command area of the project could not be changed. Organisations like Manthan Adhyan Kendra expressed in a report that this project will create new conflicts, which happened in the case of Veda dam[24] in the Narmada Valley (Thakkar, 2014).

[24] River Veda is one of the tributary rivers of Narmada. The construction of Upper Veda project involved a dam that would submerge 14 villages. It was opposed by communities and they urged for an alternative solution. Still the dam was constructed but the process was characterised by conflicts between communities and authorities. This case has been used as an example to explain that the projects which directly affect the livelihood of large numbers of people, need to develop a well-defined rehabilitation plan prior to construction (GWP, 2013).

In 2014, there were newspaper reports expressing that the *Sangam sthal* at Ujjeni was in a state of neglect. A resident Vishal Thakur expressed in this report that, "people throw puja material into the water that has been brought to this village through pipeline project. He added that the *sthal* has been stinking and nobody has bothered to maintain the area which was once inaugurated with huge fan fare by the government" (Barnale, 2014). There were other reports in which religious leaders were divided on the idea of taking bath in the water which would be provided to Kshipra through NKSLP. Swami Avimuktechwaranand, the chief disciple of Jyotish and Dwarikapeeth Shankaracharya, expressed their anger through a newspaper that, they would prefer to wallow in the Kshipra riverbed in *Simhasta* rather than to take dip in the unnatural and cursed confluence. Another religious leader, Swami Swaroopanand Sarasvati in Varanasi stated, "By merging these two rivers, the state government has defeated the very purpose of Kshipra. It is believed that a dip in the Kshipra helps one attain moksha. Kshipra will lose its significance with the merger" (Pillai, 2014).

Further, in the year 2017, there was a newspaper report (TOI, 2017) stating that thousands of gallons of water from the Narmada-Kshipra link project line parallel to Indore-Ichhapur highway near Jhabar village of Khargone developed a leakage. The pressure of water was so high that it rose to a height of more than 50 feet like a fountain. Mr. RS Gupta, executive engineer of NVDA, denied the leakage of the pipeline but did admit to the newspaper that one of the valves of the pipeline got loosened which was later fixed (TOI, 2017). Further there was another report in which the government of MP was ready to launch the Narmada-Kshipra Link Project-II, "under this project, 15 cumecs of water would be lifted to a height of 359 meters, from the Omkareshwar reservoir and supplied to the Kshipra basin near Kakukhedi village in Indore district, situated 45 km from the reservoir. 10 cumecs of water will be utilized for irrigation, and 5 cumecs will be provided to industries. This project will facilitate irrigation on 30, 000 hectares of land in Ujjain and Shajapur districts. The water will be provided through underground pipelines

with pressure pumps, which will make irrigation possible through a sprinkler system. Besides irrigation, potable water will be provided to Dewas, Ujjain, Nagda, Maksi, Shajapur, Ghatiya and Tarana. Water will also be provided to industrial units located in Ujjain under the project" (FP, 2017).

Currently, the status of Kshipra river has been of that of a polluted river as it carries all the contaminated water from Dewas, Indore and Ujjain cities. The government's attempts have not been very successful to ensure that such illegal dumping of polluted water could be stopped. Pouring Narmada's water into a polluted river is increasing the amount of polluted water. This section based on government reports is an attempt to explain where the understanding of socio-technical interventions has gone wrong. The claims of the CM that only Narmada river can solve water scarcity in Malwa region doesn't justify the problem of water scarcity. There are certain examples from the Malwa region such as "*Jal Khet*", where the villagers of Dewas, have created ponds to conserve rainwater for irrigation purposes (IWP, 2017). Through critically analyzing Narmada-Kshipra Simhastha Link Project (NKSLP), it has been realized that the projects which are considered to be solving the problems of scarcity are also the ones creating them.

Summary

This chapter explains the deterioration of the Khan river due to increasing social and technical interactions on its banks. It first provides details of the water supply of Indore city. It shows that the extraction of water supply in the city began with the Khan and its tributary the Sarasvati, but due to over-extraction of water they dried up. So, water was extracted from the Gambhir another tributary river of Kshipra. Still, the water requirement of Indore city was increasing due to its population boom, so the state government commissioned the Narmada water in two phases. Even though three minor and one major rivers were used as a means of water supply, Indore still faced water scarcity in the years 1990, 2008, 2011 and 2016. Therefore, the main reason of depletion of the "subaltern" river Khan was de-silting, accumulation of

sewage, waste decomposition, urban expansion, temperature increase, changing patterns of rainfall and over-extraction of water.

Slums sprawling on the banks of the Khan show that as the expansion of Indore city took place a number of slums started to increase on the banks of this river. To provide a better living condition to slum dwellers and to clean the Khan, the administration introduced Indore Habitat Improvement Program. This program tried to provide drainage pipelines to connect all the sewage flowing through slums and directing them towards sewage treatment plant. This way the local administration tried to save the Khan from sewage discharge but due to engineering defects, and choking of pipelines, water contamination increased making this "subaltern" river, sewage and garbage dumping site. The administration of Indore introduced cleaning projects to rejuvenate the Khan, but due to the sanction of inadequate funds or no funds, these cleaning projects never reached their target. This further lead to an increase in sewage discharge in the Khan for 275 MLD and is expected to rise upto 335 MLD by the year 2020.

The second river discussed in this study is the Kshipra, the holy river of Ujjain city. This river went dry after 1936 due to over-extraction of water. The reasons for drying of the Kshipra noted through various literature and fieldwork inquiry were deforestation which resulted in soil erosion, flooding, discharge of industrial effluents and domestic sewage and increase of human settlements. Another major reason for depletion of Kshipra was the Khan and the Sarasvati rivers which meandering through the commercial cities of Indore brought all the sewage of the city into the river. Irrespective of the holy status of the Kshipra, it continues to receive domestic, industrial and religious waste dumped into it every day. Some studies noted that the water quality of Kshipra has degraded to such levels that its water is not even fit for bathing. The administration tried to clean the Kshipra firstly by recognizing that there is a need to stop water being lifted from the Kshipra due to increase in water contamination of this river. A sewage treatment project was initiated to prevent

wastewater from reaching river Kshipra. Most importantly, in the wake of the Kumbh Mela, the government took temporary measures like diverting river Khan and banning the drawing of water from littoral areas of river Kshipra. It took a permanent measure like laying pipelines across Vindhya mountain ranges, scaling a height of 348 m to bring water from the Narmada so that the bathing requirements of the people during Kumbh Mela could be fulfilled.

These insights mentioned above show that the Khan and the Kshipra which were once perennial and were the major reasons for the existence of cities like Indore and Ujjain are in a threat today. The way these two rivers have been exploited shows that humans have been concerned more about fulfilling their needs rather than taking care of these resources. Connecting these rivers with projects to keep them clean and restore them is difficult as it can be seen through the attempts of the government for the past 24 years to revive the Khan. Further even Kshipra has been converted into a seasonal river which has forced the government to bring water from outside sources using pipelines. This has been done mostly to fulfill the water requirements of the devotees who would want to take a bath during the festival of Kumbh Mela. Surprisingly, only a few people have questioned the move of the government; the projects are propagated in such a way that most people get convinced by such projects.

This chapter expresses the environmental concerns related to the neglect in the governance of the rivers in India. The next section highlights these drawbacks and creates a way forward to deal with such a crisis.

Chapter 3: Literature Review

This chapter explores the ideas and the apparatuses through which rivers have been governed in the past, in India. The focus of this chapter is to express that environmental concerns came rather late on the checklist of the government, and when these concerns began to rise in India, they were mostly technocratic. This approach has its intellectual limitations, i.e., it equates nature with 'environmental problems' ignoring other important human-environment relations. It creates political biases, as the knowledge it produces is technocentric which do not address the deeper causes responsible for problems related to rivers. One such problem addressed in this thesis is the exploitation and degradation of rivers in India. It highlights the research efforts and opportunities not only to understand the ecology of major but also minor rivers. This chapter expresses these concerns through two sections; section 3.1 provides the details about the governance of rivers in India, and section 3.2 conveys the governance of rivers in Madhya Pradesh.

3.1 Governance of rivers in India

To explain the governance of rivers, this section is divided into three subsections which elaborate the governance of rivers during different time periods. Section3.1.1 details the importance of rivers and its governance during pre-colonial times; section 3.1.2 elaborates on the governance of the rivers during the colonial period, and section 3.1.3 describes the pattern of governance in the post-colonial period.

3.1.1 Pre-colonial period

The first human settlement in India grew around rivers, during, the Indus Valley Civilisation. This civilization flourished around 2500-1500 BC. More than two thousand years before Christ the Indus river watered the Punjab, the land of the five rivers, through its tributaries Jhelum, Chenab, Beas, Ravi and Sutlej (Basham, 2004, p.1). The city

of Mohan-jo-daro which was part of this civilization had a great bath as its most important structure. It was connected to many water channels coming from the Indus river (Majumdar et al., 1978). The archaeological survey of Mohan-jo-daro reveals that the disappearance of this city was due to regular floods which can be inferred through the abundant accumulation of water deposited silt found on the site. These floods depicted the periodic flow of the Indus river (Dales, 1966). Other cities that grew around rivers flowing in India was the Harrapan cities, which flourished during this period on the river banks and were later destroyed due to the drying up of the Sarasvati river. The might of the rivers have been such that, the cities have both flourished and disappeared on the banks of the rivers which is the probable reason for the reverence of the rivers in ancient Indian texts.

The Rig Veda composed between 1500-2000 BC in its tenth chapter (hymn-75) sings the praises of the rivers, describing their grandeur as 'beyond compare' (Griffith, 1896). Manusmriti written around 1250-1000 BC, in its second chapter shloka 17, 21 and 22 refer India as the 'Land of Veda', as the country that was created by Gods between the two divine rivers, Sarasvati and Drishadvati. Praises of the Sarasvati sung in Manusmriti and Rig Veda have disappeared. The archaeological survey revealed the presence of river Sarasvati, which went dry around 1900 BC as a result of geological changes in the western region of India. Sanyal (2012) calls the Vedic Indian landscape the land of the seven rivers- Indus, Ganga, Brahmaputra, Sarasvati, Narmada, Krishna and Cauvery. Thapar (2002, p.42) also talks about the rivers to be a blessing to the cultivators, as they brought in fertile silt to the lands but some rivers like the Sutlej, the Kosi, the Tista, and the Brahmaputra have frequently changed their courses, or cause heavy floods thus bringing great disaster.

The above discussion suggests that rivers play an important role in the formation, growth, and death of a civilization. The experiences of the Indus Valley Civilisation, are proof enough that any changes in the river system, geological or otherwise, had an immense impact on human life and settlements. It has been argued that the gradual weakening of the Indus Valley Civilisation and its subsequent disappearance relates to the shifting of river courses on account of geological changes associated with the continuous elevation of the Himalayas. “Satellite imagery have clearly shown the paleo-channels of the Sarasvati, which dried up when the Sutlej shifted its course westwards to join the Indus, and the Yamuna shifted eastward to join the Ganga” (Guha and Gadgil, 1993, p.78-80)

Apart from the praises and the importance, the ancient texts have given to the rivers, Manusmriti also provides water law which mentions that water is indivisible (Ch IV, 226-229). Kings had the responsibility to protect water and collect fines from anyone who crosses the limits of using water (Ch VIII, 61-69; Ch IX, 264-266, 281). The diversion or obstruction of water has been discouraged and the laws imposed were social reprimands and punishments for those who polluted the water or who stole and diverted it (Ch IV, 46,48,56; Ch XI, 174; Ch VIII, 309; Ch IX, 281).

Further, in the Mauryan period, Megesthenes describes India as quadrilateral shaped, bounded by the Indus river on the west, “which is perhaps the largest of all rivers in the world after the Nile” (Fragment-I, Diod. II, 35-42). Megesthenes notes that India is the land of several rivers, both large and navigable, having their origins in the mountains that stretch along the northern frontier, traverse the level country, “and a few of these, uniting with each other, fall into the river called the Ganga” (Fragment-I, Diod. II, 37). While Megasthenes describes the beauty of the rivers and their importance during the Mauryan period,

Arthashastra provides a detailed account of governance of water during this period. The Arthashastra mentioned that all water belonged to the King and that users were to pay taxes to draw water from irrigation systems installed by the King. The system of taxes was very elaborate. When new tank and embankments or renovation work were undertaken or when waterworks were cleaned and made ready for use, there was a 5,4, or 3 years exemption from taxes. There was the limited provision of private ownership. Private owners were allowed to give water to other parties through irrigation works in exchange for produce. It stated that in irrigating one's field, no harm is to be caused to others. Besides, there were other prohibitions too such as the release of water from dams without a legitimate reason; the obstruction of the legitimate use of water by others; the obstruction or diversion of the watercourse, and the building of waterworks on the land belonging to someone else (Cullet and Gupta, 2009)

Around the 9th century, development of new tank technologies and improved dams and canals in South India paved the way forward for the development of large-scale peasant agriculture that displaced pastoralism (Mosse, 2003, p.53). From the 10th century to the 16th century, Islamic rulers governed Northern India. According to principles of Islamic law, water was a gift of God, that no individual or ruler can own, and that everyone should have access to water (Naff and Dellapenna, 2002, p.477). The relative abundance of water in India precluded conflicts with Islamic norms (Siddqui, 1992, p. 289). This may also explain the relative lack of attention towards water regulation during this era (Siddiqui, 1992, p. 295). The ancient period explains that the rivers were considered to be scared and holy in India. In pre-colonial times only Manusmriti talks about pollution of water and punishment or reprimand if one pollutes water. The ancient texts hardly discuss the governance of rivers in India. The reason being abundance

of water and the popular belief of worshipping rivers as goddesses that have the capacity of self-cleansing.

3.1.2 Colonial period

During the early Colonial period, the East India Company observed a good opportunity in irrigation to combine the interests of charity and commerce (Whitcombe, 2005). The opportunities of irrigation were explored by Major Proby Cautley and Sir Arthur Cotton around 1830 in both the northern and southern part of India (Naz and Subramaniyan, 2010). To have quick economic returns from water development, the colonial government tried large-scale irrigation projects in the Deccan region which was not successful due to complex social system involved in the management of traditional irrigation system. One of the efforts was a revival of Kudimarat[25].

Another example was the traditional irrigation system of Bengal which required the building of embankments along the flood-prone rivers. These rivers served the purpose of irrigation as well as protection of floods. But in this system also the peasant who required water would simply breach the embankments by diverting to his area which was termed as 'overflow irrigation' by Willcocks (1984). During the zamindari settlement in Bengal presidency, the colonial engineers were least concerned about such water issues, and so the revival of traditional irrigation failed. Irrigation was taken into their direct control (Sengupta, 1985) by creating embankments which led to drainage problems, water logging and loss of irrigation benefits (Sengupra, 1985). Therefore, the agricultural benefit started declining in Bengal

[25] It is mixture of Tamil and Arabic words: kuti meaning 'inhabitant' or 'subject' and the Arabic word maramat means 'repair' (Mosse, 1999)
Kudimarat was recreated as a myth of a traditional autonomous village institution by the colonial government in order to invent a village tradition in the image of the state's planned irrigation administration (Mosse, 1999). The myth was built by colonial government that the village communities would undertake voluntary customarily labor of kudimarat, which they had abandoned (Agarwal and Narain, 1997).

and so the administration invited the British irrigation expert, William Willcock. He pointed out that the only way to increase production is to revive the ancient flood irrigation system of Bengal (Willcocks, 1984).

So, the colonial rulers took complete control over all the resources such as water, minerals, land and forests without understanding the functioning of the irrigation system in India. Furthermore, they levied various taxes on all the resources that were provided to the communities in any form like water taxes, sub-soil water taxes, land taxes, canal charges etc. (Hardiman, 2008), which brought a lot of pressure on the communities. In the lower rainfall territory of the Upper Ganga Region, the colonial engineers started a massive construction of a network of new canals which became the mode of development (Stone, 1984). The British focused first on the 'productive' irrigation works on canals that could generate annual revenues equal to the interest returns of irrigation work by controlling famine and relief expenditure (Stone, 1984). The lukewarm response made the British shift to 'protective' irrigation which was best suited for the topography of the area (Stone, 1984); as its simple operational design went hand in hand with the homogeneity of the physical environment (Bottrall, 1992).

The colonial rule in India had three objectives: a) Financial (low operational cost and high revenue), b) socio-political (famine and drought preclusion) and c) administrative (limited field staff with little possibilities of conspiring with farmers in maneuvering the centrally determined water schedules) (Bottrall, 1992). To give shape to these objectives, a newly specialized cadre of irrigation engineers was created in order to govern the canal management by passing the North India Canal and Drainage Act (1873). In canal irrigation, the British had all the rights such as control over the regulation of water supplies,

and power to withdraw water supplies from non-co-operating farmers (Stone, 1984).

The British colonial policy in the nineteenth century drew from an international discourse of water engineering which had its roots in the transformation of water into a commodity (Worster, 1985). The way British irrigation engineers saw environment was based on mathematical modeling system which included the modeling of flow, distribution, and use of water (Gilmartin, 1995). The capitalist state promoted science and technology 'to extract from every river whatever cash it can produce' and thus transform the water into a commodity (Worster, 1985). The mathematical creation of an integrated hydraulic environment gave colonial color to colonial India. Moreover, the British regarded the local communities "in a language of 'naturalism' that defined them as parts of the 'natural' environment to be modeled and controlled" (Gilmartin, 1995). In the 1860s and the 1870s, the British irrigation policy principally inclined for larger strategic, financial and political concerns, endorsed local initiatives in private or semi-private canal buildings by local landlords and tribal chiefs (Gilmartin, 1995).

The performance of Indian agriculture due to canal irrigation facility has been controversial with scholars such as Mason (2006) glorifying that canal irrigation curtailed famines in India. Whereas, others were of the opinion that 'unbalanced irrigation development' of focusing irrigation projects and investment in Madras, the Punjab and the United Provinces, failed to feed the rest of India and could not prevent the Bengal famine of 1942, leading to the starvation of four million people (Shah, 2009). The colonial government was more interested in canal construction due to obvious reasons. But in the state of Gujarat, they encouraged construction of wells through tax exemption as they believed that irrigation could only be carried out effectively in Gujarat

from wells (Hardiman, 1998). In Gujarat, wells were the most important source of irrigation even during the colonial times as there were no major colonial canal projects in this part of India (Hardiman, 1998).

The main interest of the colonial government was to maximize revenue generation, which led to massive canal constructions of the British Government. This laid down the foundation of a new irrigation ideology of opening vast-often unpopulated-areas for farming by manipulating the large untapped rivers and reconfiguring the basin hydrology. Moreover, an unbalanced irrigation development without regional equity was initiated by having centralized structures for constructing and managing large irrigation systems on commercial lines. Colonial irrigation in India had successfully advocated that the state in partnership with science could tame the rivers for improving human welfare. This ideology survived until the end of the Empire and began dominating the water management vision in postcolonial independent India (Naz and Subramanian, 2010). In colonial times water was governed in the form of irrigation. All the resources came under the direct control of the British government. However, a profit-centric approach and a lack of intellectual and manpower investment led to poor management of water resources (especially rivers) in India. Rivers were only considered as a means of providing water to the fields, irrigate more and more land and generate more revenue.

3.1.3 Post-Colonial period

This section is divided into two parts to discuss the governance of river basins in India. The first part deals with the formation of organizations to govern rivers in India and the second part discusses the programs which were functional after independence and their success rate.

3.1.3.1 Formation of organizations to govern rivers

With regards to the governance of rivers in the post-colonial period, it has been observed that the main aim of the government of India after independence was to accelerate development and address the regional disparity of investment caused by the Britishers. Since the country was facing acute shortage of food grains and increase in the population such a huge investment in large-scale irrigation project was an important option. This is evident in the Five-Year Plan started in 1951. Prior to this plans, the constitution mentions water in the seventh schedule[26] of entry 17[27] in the state list and entry 56 [28] in the union list, in the article 262 [29]. Water after independence became a state subject and during disputes between two states, the issue of water became the part of the central government as well. This was because most of the country's important rivers were inter-state (GOI, 2007). Water was not in the concurrent list but was both in the Union and the State list. The role given to the centre regarding inter-state

[26] Explains the entries that are made through Article 262 through List I Union List, List II State List and List III Concurrent List (GOI, 2015).

[27] This entry discusses about "water, that is to say, water supplies, irrigation and canals, drainage and embankments, water storage and water power subject to the provision of Entry 56 of List I. It says that the Central Government is conferred with powers to regulate and develop inter-state rivers under entry 56 of List I of Seventh Schedule to the extent declared by the Parliament by law to be expedient in the public interest. It also has the power to make laws for the adjudication of any dispute relating to waters of Inter-State River or river valley under Article 262 of the Constitution" (GOI,2015).

[28] This entry provides that regulation and development of inter-state rivers and river valleys is declared by Parliament by Law. It says that: "regulation and development of inter-state rivers and river valleys to the extent to which such regulation and development under the control of the Union is declared by parliament by Law to be expedient in the public interest" (GOI, 2015).

[29] This article states that the adjudication of disputes relating to waters of inter State rivers or river valleys can be sorted out with: "Parliament may by law provide for the adjudication of any dispute or complaint with respect to the use, distribution or control of the waters of, or in, any inter-state river or river valley. Notwithstanding anything in this constitution, parliament may by law provide that neither the Supreme court nor any other court shall exercise jurisdiction in respect of any such dispute or complaint as is referred to in clause 1 coordination between states (GOI, 2015).

rivers and river valleys was an important one and this was reinforced using the provisions of entry 20 in the concurrent list, namely, 'economic, and social planning', by which major and medium, irrigation, hydropower, flood control and multipurpose projects were subjected to the requirements of central clearances for inclusion in the national plan.

When India attained independence, the Tennessee Valley Authority was becoming famous throughout the world (Molle, 2008), in the year 1947 a senior Madras official asserted that India needs the 'Tennessee Valley Principle[30]' (Wallach, 1985). The idea saw its fruition in 1948 when the Damodar Valley Corporation (DVC) was created. In 1954, when Nehru visited Damodar Valley Project, he remarked, "where can be a greater and holier place than this which we can regard higher and when commissioning the massive Nagarjunsagar dam on the Krishna river he proudly spoke dams as the 'temples of modern India". The significance of such projects made his government and the other governments that followed, include minor projects and later on, major multipurpose irrigation projects in the five-year plans of India. With the zeal of commitment for rapid social progress, the vast new multi-purpose irrigation projects were showcased as a matter of pride in the early post-independence years. More than 90% of public investments in agriculture were allocated for large-scale projects during the first 40 years after independence (Kishore, 2002). But these 'temples of modern India' were thwarted on three counts: firstly, a series of construction of projects at many places led to a major delay in

[30] F.D. Roosevelt established Tennessee Valley Authority (TVA) in 1933, a major experiment in large scale planning not just for his country but planning for generations to come trying in industry and agriculture and forestry and flood prevention tying, them all into a unified whole (Reuss, 1992).

completion of the project due to budget constraints (Bottrall, 1992). Secondly, these projects did not take into consideration the environmental conditions that were not supporting such projects like eastern floodplains and the Deccan areas (Bottrall, 1992). Thirdly, the old colonial legislation of giving unlimited powers to the government and the Irrigation Department continued to be practiced in all matters relating to surface water development and management, thus leaving no rights to water users (Bottrall, 1992).

Furthermore, there were certain laws that were made, related to rivers but could only partially fulfill their purpose. For instance, River Boards Act (RBA)1956, formed to enable the Union Government to consult state government boards to advise on the integrated development of inter-state basins. The reason to create river boards was to prevent conflicts by preparing developmental schemes and working out the costs of convenience between the two states. While reviewing the working of the Constitution and its acts in India, the National Commission declared, the 1956 RBA dead as neither the central nor the state boards were formed under this Act. Inter-State Water Disputes (ISWD) Act, 1956 was enacted under Article 262 of the constitution, wherein a board was constituted to provide an aggrieved state to refer to a dispute over water resources to a tribunal. The judgement passed by the tribunal was final and beyond the jurisdiction of courts. In this regard, Sarkaria Commission in its report in Chapter XVII on Inter-state river disputes recommended that there should be timely adjudication of disputes by the tribunal set up by the Union Government. Also, there was an amendment in the ISWD act of 2002, which maintained that the establishment of the tribunal should be within a year of the request made by the concerned

state government. Some of the water dispute tribunals such as the Narmada Water Dispute Tribunal, the Godavari Water Dispute Tribunal, the Ravi and Beas Water Dispute Tribunal, were not very functional as the focus was not on governance of rivers but more on increasing food production.

To fulfill the requirements of food, water was an essential component, and hence, the government wanted to form a plan for the efficient management and utilization of the available water resources in the respective areas. So, it established the National Water Resources Council (NWRC) in March 1983. With the help of this Council, the Ministry of Irrigation and Power came together again but were bifurcated in 1985 into the Department of Irrigation and Department of Power. The Department of Irrigation was re-constituted as Ministry of Water Resources (MoWR), the change in the nomenclature gave the MoWR the nodal role regarding all matters, concerning India's water resources. It was felt necessary to formulate a National Water Policy laying down priorities for various uses of water.

Furthermore, the Second Administrative Reform Commission (SARC) 7th report titled "capacity building for conflict resolution" provided a water section and gave the following recommendations: a) Need for proactiveness and decisiveness of Union Government in cases of inter-state river water disputes and act with the promptness and sustained attention that such disputes demand; b)Formation of River Basin Organizations (RBOs) set up for each inter-state rivers, as proposed by the Report of the National Commission for Integrated Water Resources Development, 1999 by enacting a legislation to replace the River Boards Act, 1956; c) River Basin

Organization's chairman was made the member of NWRC, both these organizations were asked to play positive roles. The secretariat of the Council was expected to be more proactive and was supposed to suggest institutional and legislative reforms in detail, devise modalities for resolving inter-State water conflicts, and advice on administrative procedures for arrangements and regulation of use of water resources by different beneficiaries keeping in view their optimum development and ensuring maximum benefits to the people. These recommendations were made through SARC had to develop, conserve, utilize and manage water based on a framework, which was constructed to incorporate long-term perspectives, and hence it demanded a national water law (SARC, 2008).

Therefore, NWRC adopted the First Water Policy in the year 1987 in which water was allocated for human welfare as well as for economic development. The National Water Policy in 1987 stated that water-resource planning should be done with reference to a hydrological unit such as basin or sub-basin. When NWP was formulated in 1985-87, the question of the river basin authorities came up, but most states were apprehensive of their own powers being eroded, and eventually, NWP made a vague reference to 'appropriate organizations'. The 'appropriate organizations' like Damodar Valley Corporation (DVC) was indeed intended to be a river basin authority, but that effort, modeled on the lines of Tennessee Valley Authority, was before the adoption of a quasi-federal Constitution. While it has served some useful purposes, it has not, in fact, functioned as a river valley authority. Its multiple functions (power generation, flood moderation, irrigation and the general development of the area) were whittled down over

the year, and the DVC today mainly remains as a power-generating body, much of which is thermal power. Similarly, the Bhakra-Beas Management Board is a system-management body and not a basin planning organization. The Betwa River Board was another one set up under a specific parliamentary enactment, but this was only for the specific purpose of overseeing a particular project (Iyer, 2013).

Another example was the Narmada Control Authority, a body set up under the orders of the Narmada Water Dispute Tribunal with limited functions relating to cost allocations. The rehabilitation of project-affected persons was later enlarged to cover the monitoring of environmental aspects, but it failed to function its actual role of a Narmada Basin Authority. The river basin authorities or boards in India are not as those that exist in France, Germany, Holland, and Norway. As mentioned earlier, the NWP (1987) did talk about planning for a hydrological unit such as a basin, sub-basin and about 'appropriate organization', but actual functions of these organizations were never operationalized. The National Commission for Integrated Water Resources Development Plan (1999) recommended a river basin organization as a representative kind (in the hope that this would prove more acceptable), with a very large principal body of a 'general assembly' or 'river parliament' kind but still even a small executive committee could not be formed (Iyer, 2013).

Due to the various drawbacks of the first water policy, a new water policy was adopted in 2002. In this policy, river basin organizations were mentioned, but their scope and powers were left to the basin states. As pointed out before, it won't be unfair to say that water resource planning in India was by large tended

to proceed based on discrete, individual projects. The 'basin planning' as a project was indeed attempted in several cases; for instance, the Bhakra Nangal, the Sardar Sarovar, the Gandhi Sagar, and so on, were not supposed to be 'stand-alone' projects, but were to be envisaged as parts of larger systems. NWP 2002 insisted on the formation of basin-wise assessment of resources and identification of storage sites by the Central Water and Power Commission in the 1950s, but they were not entirely successful. 'Integrated planning' was understood as planning a cluster of projects. In the 1980s, a multidisciplinary group in the Central Water Commission prepared a Ganga Basin Master Plan, but for a certain reason it was never made public, as such, no comment can be made on its contents. National Water Development Agency has been making assessments of basin surpluses and deficits, but this was essentially in the context of 'inter-basin transfers', for which it has been identifying possibilities of transfers, strategies, and links.

Furthermore, during that time, India was also facing challenges of sustaining its rapid economic growth while dealing with the global threat of climate change. India wanted to collectively and cooperatively deal with the threat of greenhouse gas emissions by long-term and intensive industrial growth and high consumption lifestyles in developed and developing countries. India collaborated with the United Nations Framework Convention on Climate Change (UNFCCC) to establish an effective, cooperative and equitable global approach based on the principle of common but differentiated responsibilities and respective capabilities, enshrined in UNFCCC. For this purpose, the National Action Plan on Climate Change (NAPCC) was released in the year 2008. This plan was

responsible to pull together governments plans on water, renewable energy, energy efficiency agriculture and others into a set of eight missions.

This was adopted under the National Water Mission, and it envisaged within NAPCC with the core objective of "conservation of water, minimizing wastage and ensuring its more equitable distribution both across and within States through Integrated Water Resource Development and Management" (Comprehensive Mission Documents for National Water Mission, 2011). This mission was responsible in the following areas: policy and institutional framework, surface water management, groundwater management, domestic and industrial water management, efficient use of water for various purposes, basin-level planning and management (CFDF, 2015). NWM was also created to review national water policy, for financing water resources projects and criteria for designing and planning for water resources projects (MoWR, 2009).

Following the National Water Mission, a revised version of National Water Policy of 1987 and 2002, was framed in 2012. This policy was created to limit utilizable quantities of water owing to uneven distribution over time and space. In addition, there were challenges of frequent floods and droughts in one or the other part of the country. With a growing population and rising needs of a fast-developing nation, the given indications of the impact of climate change and availability of utilizable water was under further strain with the possibility of deepening water conflicts among different user groups. Low consciousness about the scarcity of water and its life-sustaining and economic value resulted in mismanagement, wastage, and

inefficient use causing pollution and reduction of flows below minimum ecological needs. There were inequities in distribution and lack of a unified perspective in planning, management and the use of water resources. The objective of the National Water Policy of 2012 was to take cognizance of the existing situation, to propose a framework for creation of a system of laws and institutions and for a plan of action with a unified national perspective. This policy was released in the year 2013 (MoWR,2017).

In 2014, the Ministry of Water Resources was renamed as "Ministry of Water Resources, River Development & Ganga Rejuvenation". This ministry was assigned additional work under its new name: a) It was to form the National Ganga River Basin Authority including the Mission Directorate; b) formation of National Mission for Clean Ganga and other matters related to Ganga rejuvenation; conservation, development, management, and abatement of pollution in the Ganga and its tributaries. The formation of specific ministry to clean the Ganga shows the concern of the government, but the functions of the ministry again focus only on investment in large-scale projects with a capitalist approach to control or utilize river water and intensive technology. These approaches are used by the government in India to justify all the actions taken to rejuvenate rivers. Such governance believes that rapid economic growth will bring prosperity and wealth to the people of India by eradicating poverty, hunger, and injustice. Such governance propagates an 'investment friendly' environment.

3.1.3.2 Formation of programs to govern rivers

The discussion on pollution of rivers in India began in 1981 when the Indian Science Congress was held at Varanasi. The

scientists expressed their concern about the growing pollution in the river Ganga in the presence of the then Prime Minister Mrs. Indira Gandhi. It resulted in, the Prime Minister asking the Central Board for the Prevention and Control of Water Pollution (now called Central Pollution Control Board (CPCB)) to conduct a comprehensive survey of the Ganga. The board published two comprehensive reports that expressed concern about the deteriorating status of the river. It formed the base, from which an action plan to clean up the Ganga was developed (Priyadarshi, 2011). Following this report in 1985, Rajeev Gandhi's government introduced the Ganga Action Plan, the objective of which was to improve the quality of water in the river. This plan was fueled by a PIL (Public Interest Litigation) filed by Mr. M.C. Mehta (Petition No. 3727 of 1985 under Article 32 of Constitution of India). This PIL addressed pollution caused by industries like the Bharat Heavy Electricals Limited in Bhadrabad, near Haridwar, for increasingly discharging untreated industrial effluents into the Ganga. This PIL demanded restraining such industries that had mushroomed on the banks of the river Ganga and were constantly polluting it (Venkataramiah, 1988).

The discussions probes and concerns from the government and civil society resulted in the formation of the Ganga Action Plan (GAP). This plan was divided into two parts; GAP I and GAP II. GAP I was initiated in 1985, it included 261 schemes spread over 25 class I towns of UP, Bihar and West Bengal wherein the total wastewater estimated from these towns was 1340 MLD in 1985. 34 sewage treatment plants with a treatment capacity of 868 MLD were set up under this plan. The focus of this plan was on an interception, diversion, and treatment of sewage generated from these identified towns. GAP I was declared

complete in 2000 at the cost of Rs**.** 452 crores (ref. document 6 of Annexure) (NMCG, 2018). GAP II was started in 1993 which was an extended version of GAP I. It covered 59 towns located along the river in five states of Uttarakhand, Uttar Pradesh, Jharkhand, Bihar and West Bengal. Under this plan, 314 schemes were sanctioned, and 264 schemes were complete. The expenditure incurred was Rs. 486.57 million and sewage treatment capacity of 229.31 MLD was created. The total expenditure under both the action plans was Rs. 938.57 crore (AHEC IITR, 2009). In 1995 GAP II was expanded into the National River Conservation Plan (NRCP), and still condition of the river was deteriorating, and so there was a need for revamping the river conservation program which led to the formation of NGRBA (National Ganga River Basin Authority) in 2009 under the Manmohan Singh government. It was formed under section 3(3) of the environment (protection Act, 1986) and under this act, the Ganga was declared a "national river" of India. This authority came under the Ministry of Environment and Forests. The objective of this authority was to ensure effective abatement of pollution and conservation of the river Ganga by adopting a river basin approach for comprehensive planning and management (NGRBA, 2011). Under this authority including the GAP-II expenditure and schemes, a total of 652 schemes were completed and Rs. 4691.55 was the expenditure incurred upto March 2014 for implementation of schemes under NGRBA (NMCG, 2018).

The low success of schemes like GAP-I and GAP-II was due to the non-involvement of local leaders in communicating the problems to Hindus who were connected to the Ganga. The word 'pollution' in GAP-I and GAP-II was used to describe the condition of the Ganga which was related to the faecal matter,

dissolved oxygen and biological oxygen demand but it was misunderstood by the Hindus that the Ganga was spiritually polluted, i.e. its sacred purity has declined which meant declining social and religious values. This confused and offended the Hindus (Das and Tamminga, 2012). The government's decision to monitor pollution along the river Ganga using police force led to worshippers being harassed. There were other claims that the police were engaged in corruption rather than getting the Ganga cleaned: "They would dump dead bodies in the river and pocketed the money that was by the municipal corporation for cremation of unidentified bodies" (Das and Tamminga, 2012). These actions resulted in local communities rather than getting involved in cleaning river Ganga, were found themselves being alienated from this program. Therefore, two crucial reasons of unsuccessful GAP I and II projects were: using technocratic approach to control pollution on a vast multi-faceted community which has its cultural and religious understanding of pollution. Focusing on the towns of major rivers to clean polluted stretches rather than focusing on minor tributary rivers which were carrying sewage of various cities and contributing it into river Ganga. NGRBA declared River Ganga a national river and emphasized on towns which were close to major rivers.

In July 2014, with Mr. Narendra Modi becoming the Prime Minister of India, the NGRBA was transferred from the Ministry of Environment and Forests to the former Ministry of Water Resources (MoWR), and was named as "Ministry of Water Resources, River Development and Ganga Rejuvenation" (MoWR, RD, GR), as Narendra Modi became the Prime Minister of India. The Modi government thought of implementing Namami Gange Programme (NGP) since the

pollution in the Ganga was increasing. A newspaper report expressed that there was around 3,636 MLD of sewage discharged into the Ganga without treatment, against the capacity of 1027 MLD (TOI, 2015). Therefore, this ongoing program was an integrated conservation project with a budget outlay of Rs.20,000 crore, to accomplish its twin objectives of effective abatement of pollution, conservation, and rejuvenation of the Ganga (NMCG,2018). Under this program, the National Ganga River Basin Authority (NGRBA) had an implementing agency named National Mission for Clean Ganga (NMCG) (PTI, 2016). Earlier this agency was part of Ministry of Environment and Forest but as the government changed in 2014, it was transferred to renamed Ministry of Water Resources, River Development and Ganga Rejuvenation (Alley, 2016).

The Modi government placed much more emphasis on reviving the river, by allocating a huge amount of money. This initiative was appreciated as well as criticized by various environmentalists. BD Tripathi, from Benaras Hindu University, rightly expressed in a report by Sengupta (2015) that, “only investment of money is not enough. A proper direction and holistic plans must be put in place for concrete results. I don’t understand why the budget did not prioritize

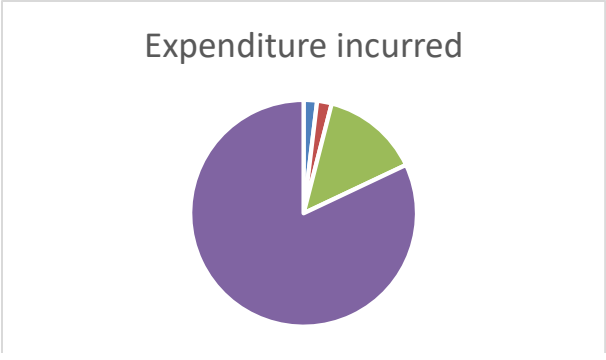


Figure 3: Expenditure for schemes for cleaning river Ganga

ecological flow of the river. There is no dearth of money for the river

cleaning program. But this budget will make no difference as the existing revival plans are flawed."

Another activist and environmentalist Rajendra Singh, chairman of Rajasthan based non-profit Tarun Bharat Sangh, expressed in this report that he thought that "there should have been a separate budget for rejuvenation of small rivers in the Ganga Basin. This would have helped bring the flow back into the main river in the basin. There should have been allocation for projects to separate storm-water drains and drains which carry sewage water. This would help in improving the quality of the Ganga" (Sengupta, 2015). Even today municipalities dump raw sewage into storm-water drains which flows into the river and pollutes it. Mr. Singh was not wrong in pointing out the drawbacks of the schemes, that overlooks the smaller streams which have been the lesser focus of the research so far. It is high time for river basin planning to take shape. Its important to consider the characteristics and problems of upstream and downstream rivers. So far, the schemes and programs implemented were specific to towns, cities and stretches that pollute the rivers more than focusing on the tributaries forming a confluence between upstream and downstream. Similar to what Iyer (2015) talks about in his book "Living rivers, Dying rivers", "millions of people in Delhi, know that the river Yamuna is the 22-kilometer stretch passing through Delhi. But they are unaware of or unconcerned with its major tributaries like river Tons, river Hindon or river Chambal which are further connected to the lower-order tributaries such as river Banas which supplies water to Jaipur, the Kshipra

which flows in Ujjain, the Betwa near Jhansi, the river Ken near Banda, and even the Yamuna, is not seen as a part of the river Ganga. Just imagine what the Yamuna would be like if the river Tons did not join it or river Chambal did not meet it downstream, and what the river Ganga would be at Prayag without the Yamuna".

Ravi Chopra, director at Dehradun-based non-profit People's Science Institute, believes that maintaining ecological flow in the Ganga is very important. He says, "ecological flow can be brought back if farmers reduce the use of water from the river for irrigation or if less water-intensive crops are cultivated. I had thought the budget would provide for paying these farmers for ecological services and would encourage farming of crops which require less amount of water for irrigation". He also claims that government should encourage Public Private Partnership (PPP) for new sewage treatment plants and payments to private parties to be conditional on the quality of treated water coming from these plants (Sengupta, 2015). Environmentalists universally agree that India cannot afford another unsuccessful attempt of gigantic proportions because 7,300 MLD has been already flowing directly or indirectly into Ganga every day and effluents from 764 polluting industries on the banks of the river are continuing to add to the problem (DTE, 2016).

3.1.3.3 Literature on Major rivers

While investigating the rivers in India have been referred to the variety of literatures that has been explored in both sciences and social sciences. The need for more research and theories in social sciences have also been discussed to understand the ecological and environmental concerns of the rivers in India.

The study attempts to show that in terms of major rivers one can still find studies in social sciences, but for minor rivers there aren't many.

Beginning with sciences, there have been some studies, for instance, by Kilgour and Dinar (2001) which discuss about sharing of water concerns between nations where water bodies are internationally shared. Some of the highlights of the aforementioned study is the controversy over the operation of Farakka Barrage on the Ganga between Bangladesh and India. The paper suggests flexible ways and means to share water internationally. Singh et al. (1999) provide a study on sediments which form an integral part of the river. In their research paper, they discuss one of the major tributaries of the Ganga i.e. the Damodar river. Immerzeel et al. (2010) discuss about the Indus, the Ganga, the Brahmaputra and other international rivers which are dependent on upstream snow and ice reserves of these basins, crucial for sustaining seasonal water availability. This study explains how climate change and food security differs substantially in Asia to the extent that no generalization is possible among basins and that effects on Indian rivers can be severe owing to a large population and high dependence on irrigated agriculture and melt-water.

While studying the status of organochlorines pesticides in the Ganga river Basin, Mutiyar and Mittal (2013) explain that there are levels of contamination of organochlorine pesticides (OCPs) in all the stretches of the Ganga Basin. Different types of OCPs dominate different stretches in accordance to land use practices and agriculture runoff generated from the river stretches. Pandey et al. (2010) show that there is a high concentration of heavy metals in the water of the Ganga basin.

These observations present, that use of such water for drinking may lead to potential health hazards in an international recommendation by (WHO) while in India, it comes under the permissible limits. Sarkar and Bain (2006) discuss the requirement of conservation and management priorities developed for the Gerua River in the Ganga river basin surrounded by protected lands between India and Nepal. The study suggests maintenance of both erosional and depositional channel habitats with depths, substrates, and current velocity, inclusive of the ranges reported. The erosional and depositional nature of the key habitats requires the rivers to maintain the flow capacity for channel forming functions.

Chatterjee et al. (2012) provide in their study the explanation that after a decade in the Gangetic West Bengal region, irrigation increased by 7 to 8 % and by 2050, it may further increase 14 to 15 % more. They suggest the need for evolving such varieties of potatoes which will require less water. Singh and Singh (2005) talk about the Ganga river ecosystem being continuously altered by several ongoing anthropogenic processes, accommodating multi-dimensional pressure due to nearly four-fold increase in population. Holeman (1968) speaks about Asia being the largest continent, which produces the highest amount of sediments. According to the UN publication of 1953, it has been declared as “the sediment problem”. The Ganga river in India is the second largest carrier of sediment, discharging 1½x 10^9 tons of sediments into the Bay of Bengal.

In social sciences, Alley (2002) provides an ethnographic detail of wastewater management, uses of water and the meaning of waste and scared power. Her book analyses the human predicaments caused due to disposal and accumulation of waste

tracing how India elucidates the impact of wastewater flowing into a sacred river and their cultural practices. In her book, she highlights a separation between the discursive and historical strands concerning waste and scared purity of rivers in India. She addresses a very important question through her work i.e. "If river Ganga is scared, then why is it polluted?"

Calopy (2012) begins her study with her observations of the rivers in South Asia. In her book, she states that rivers in South Asia are in deep trouble due to multitude of subjects affecting them like global warming, melting glaciers, bad engineering of all kinds, and embankments at the wrong places. She also highlights that in South Asia the groundwater has been overpumped, ponds and rivers have been neglected and have turned into sewers. Still, rivers are used to take holy dip such as the Ganga which was traditionally revered by the people, has now deteriorated dramatically due to economic progress and gross mismanagement.

Kumar (2017) in his paper discusses the spiritual, historical, socio-economic and cultural attributes of the Ganga river which are mostly untouched by scientific papers. Sen (1994) describes the importance of rivers and how are they perceived differently through a comics version. He expresses the consequences of development on rural people and the rivers. Baviskar, (2003) through her book 'Waterlines' expresses how rivers are the lifeline of India. She brings together in her book various contributions in the form of stories, essays, and poetry to reflect the presence of rivers in the lives of people. It is a blend of classical and contemporary writing. The courageous battle of Agyega's aunts against the Beas river, Mukul Sharma traces the travails of the Biharis living in the shifting diara land, Ruchir

Joshi's tributes to the Hoogly and the Howrah Bridge and so on. These are just a few of the contributions from the field of social sciences, but more literature is required to create an awareness and conduct surveys to create a bank of information on the state of rivers and their immediate as well as long-term impact on society. In the field of research, there is also a requirement of interdisciplinarity which would provide ways and means to understand the river ecology and help preserve it rather than shifting to such crops which require less water, or technical alternatives to sort out water crisis. One of the essential elements of the literature developed in social sciences is to understand the deterioration of major rivers like Baviskar's 'In the belly of the river' discusses about tribal conflicts over development of Narmada valley, Aitkin's (1992) 'Seven Sacred rivers' also talks about the seven major rivers of India, Daron's (2008) book is on caste, occupation, and politics on the Ganga. Such writings are less for minor rivers which results in ignorance of the cultural, social and political insights of these rivers. The next section discusses the governance of rivers in the MP, to explain the disregard towards the minor rivers.

3.2 Governance of Rivers in Madhya Pradesh

From the ancient period, in Madhya Pradesh (MP), the focus has been on irrigation. The Chandel Kings in Khajuraho MP constructed water storage tanks in the first century AD. Similar tanks were constructed by Kalcuri dynasty in 1120-35 in Bilaspur district. These tanks were created for irrigation purpose. Similarly, Palakmati in Bhopal and Moorum Nallah in Balaghat district were constructed in 1933 and 1936 respectively. In 1940-44, in Gwalior a few irrigation projects were constructed like Kaketo dam, Shank-Asan Project, Aaoda Dam, Tigra dam and Harshidam with an irrigation potential of 1.70 lakh acres. The irrigation works continued upto 1950-1952, keeping

security aspect in view, of the Central Provinces Irrigation Committee (1927-29), which emphasized a complete ban on new irrigation activities until the schemes were completed and proved remunerative. After independence, from the first 5-year plan (1950-51) onwards, the state had 2 major projects, 18 medium projects and 618 minor irrigation scheme having irrigation potential of 4.69 lakh hectare. At the evening of re-organization of the state in 1956, the state had 4.84 lakh hectare irrigation potential 3 major, 37 medium and 948 minor (MPWRD, 2009).

In 1984-85, the state had 17 major, 109 medium and 4991 minor irrigation schemes with an irrigation potential of 24.52 lakh hectare. The irrigation potential in the year 1997-98 had become 33.04 lakh hectare having 22 major, 134 medium and 6910 minor irrigation schemes which continued to increase further in year wise development of potential irrigation. The ancient department of Irrigation is currently known as Water Resource Department of Madhya Pradesh. This department takes care of the creation and maintenance of irrigation potential through the construction of water resources projects. This department also looks after disaster management in the form of construction and maintenance of flood control works, reservoir operation reconstruction of structures damaged by the cyclone, maintenance and regulation of major, medium and minor irrigation projects, flood control and drainage work. The emphasis on irrigation from the very beginning shows that there has been a focus on the increase in practices of irrigation rather than understanding how to sustain the resources, through which irrigation could become possible.

Madhya Pradesh has five river basins draining in the state namely, the Ganga (Yamuna Basin), the Narmada, the Tapti, the Mahi and the Wainganga (part of Godavari Basin). The twelve rivers which flow through these basins are the Chambal, the Betwa, the Sindh Dhasan, the Ken, the Paisuni and the Baghian rivers join the Yamuna which further joins the Ganga. The Son and the Tapi join the Ganga directly. The total length of these rivers in Madhya Pradesh is

approximately 3956kms, and 553kms share the boundaries with other states (MPWRD, 2009). Out of the rivers that drain Madhya Pradesh, 21 are identified to be polluted (CPCB.na) due to lack of understanding of the environmental concerns.

Hydrological Information System was launched in 9 states and 6 central level agencies in which Madhya Pradesh was one of them (CPCB,na). The Water Resources Department, of the MP Government by the water policy of the Government of India and with the technical and financial assistance of the World Bank, has undertaken a Hydrology Project in two phases. This hydrology project was divided into three sections: surface water, groundwater, and water quality. Hydrology Project (HP) Phase I took place between 1996-2003 (MoWR,RD,GR, 2014). It was created taking into consideration Article 1 of the National Water Policy (1987) which was pertinent towards Hydrological Information System (i.e., prime requisite for resources planning was a well-developed information system). The objective of this phase of the project was to develop sustainable Hydrological Information System (HIS). The use of standardized equipment throughout the process, uniform and adequate procedures for collecting, monitoring, and performing chemical analysis on the samples, and development of proper infrastructure for the insurance of sustainability and to produce computerized, authentic, validated, comprehensive and easily accessible database. The reason why the Government of Madhya Pradesh took this project was to find a solution of appropriate use of water resources in MP. Freshwater resources were continuously shrinking, groundwater table was depleting, and water quality was deteriorating. Consequently, successful completion of HP-I, "HP-II was formulated which was a follow-up project of HP-I from the year 2004 with project appraisal from World Bank (MoWR,RD,GR, 2014).

The objective of HP-II was to promote the sustained and effective use of Hydrological Information System developed under Hydrology Project Phase I by all potential users concerned with water resources planning and

management, both public and private. It was to be achieved by: a) strengthening the capacity of WRD (for both surface and groundwater) by developing and sustaining the use of HIS for hydrological designs and decision tools, b) improving capabilities of implementing agencies at State/Central level using HIS for efficient water resource planning and management to facilitate country's poverty reduction objectives, c) establishing and enhancing HIS as user-friendly, demand responsive and easily-accessible HIS and d) improving access to the HIS by public agencies, civil society organization and the private sector by supporting outreach services (MoWR, 2014). To fulfill these objectives, the MP government has prepared a 3 Purpose Driven Studies (PDS) for real-time monitoring of groundwater quality and surface water as well. The purpose of these PDS were to develop long-term monitoring mechanism to keep a constant vigil on the progression of water pollution by adopting a systematic and periodic procedure for physico-chemical parameters along with the study of microbiological indicators of pollution (MPWRD,2009). This study acknowledges the attempt of both central and state government of using HIS system to provide water quality and quantity assessment online, but it was also important to emphasize the deeper concerns which hold importance in the depletion of water resources.

The focus of this study is on the Kshipra and the Khan which are mostly included in the word Chambal and to emphasize through this literature review that the administration of Madhya Pradesh has from the very beginning focused on irrigation projects to fulfill the agricultural needs of the state. The water bodies which have been exploited so far do not find any mention in the MPWRD. Its hard to find any information related to management of water resources in MP other than MPWRD where they after irrigation focus on Hydrological Information System. This system was designed to collect the data about the degrading water quality and the difference it has brought in the state of these water bodies, for instance, the Khan and the Kshipra. The literature finds mention that one phase of HIS is over and the second one is in progress,

but even in 2018, there are cities and villages in MP which suffer from water scarcity as discussed in this study in the section 2.1.3 and section 2.2.

3.2.1 Literature on "subaltern" rivers

This section elaborates on the kind of research which has so far been on minor rivers with special reference to the Khan and the Kshipra. Ganasan and Huges (2002) through their study suggest that chemical habitat of both the Khan and the Kshipra rivers have been disturbed due to the high concentrations of heavy metals and sewage and the poor physical habitat quality. In the waters of these rivers, there are a variety of non-native fishes found, which is one of the most resistant forms of human impact. The fundamental aspect of the Index of Biological Integrity (IBI) is based on the response of biological assemblages to environmental degradation. In the Khan and the Kshipra rivers, IBI scores have increased which shows a similarity to the biological assemblage with environmental degradation. The absence of consistent dominant species in these rivers are greatly disturbed by humans to support the development of dominant species (Hughes and Gammon, 1987).

The study by Billore and Sharma (2009), provides methods of treatment of the discharge of untreated wastewater in the Kshipra by Artificial Floating Reed Beds (AFRB). The study recommends AFRB as in-situ, eco-friendly river water treatment structures for small shallow, slow-flowing or stagnant water bodies. To analyze the physico-chemical parameters for testing water quality of the Khan, Nighojkar and Dohare (2014) conducted a study to calculate the quantity of discharge of domestic and industrial waste poured into the river daily. The harmful contents lead to sedimentation of organic and inorganic matter from the industries and the surroundings of the river water. These pollutants affected both the Khan and the Kshipra. In another research paper, Bhasin et al. (2015) evaluate the occurrence

and distribution of P. aeruginosa in Kshipra river and its impact on the health of the population residing near the river. The count of P. aeruginosa has increased in river Kshipra due to various activities like industrialization, urbanization, accumulation of effluents, intense agricultural operations and faecal contamination. Mass bathing is another reason which affects the nutrients concentration and organic and inorganic content of the water body.

Prasad et al. (2017) wrote a paper on the bacterial screening of the water of Kshipra after Kumbh. They found the presence of staphylococcus, bacillus, Pseudomonas and E. coli indicated that there was a heavy sewage discharge of human activities in the water during the Kumbh Mela. A paper on pollution in the Kshipra and the Khan, Vyas (2007) mentions about the brick industries situated on its banks. Brick industries cause adverse effects on not only the Kshipra water but also pollutes the soil and air where the bricks are manufactured. Use of excessive additives in soil causes soil pollution, use of a huge amount of fuel and kiln process, causes air pollution. The waste along the industries flows into the Kshipra thereby increasing suspended solids, calcium hardness, and dissolved solids. The study suggests the use of Vertical Shaft Brick Kiln (VSBK) process to decrease the pollution caused by these industries as it is an energy efficient method of firing. It also suggests usage of calcium carbonate and calcium hydroxide as desulfurizing agents in coal briquettes which can be an economical way to control pollution.

Srivastava and Rao (1984) talk about the effect of pollution on Plumalella emarginata on the surface water of MP, comparing it with protected waterworks of Bhopal. Plumalella emarginata are relatively rare and occur for a brief spell. They are small animals forming moss or coral-like calcareous or chitinous aggregation, often attaining enormous size. They live in rivers, lakes, and reservoirs and also grow

profusely in protected water, creating serious problems with potable water supplies. These species act as food for chironomid larvae, which subsequently proliferate and cause difficulties during water treatment. The study mentions the formation of a honeycomb colony of species present the Kshipra. In the Khan, it is present as a thick black color zooecia of P.emargenata.

Furthermore, Gupta et al. (2014) discuss about the degrading quality of the water of the Kshipra due to sewage discharge. Kulshrestha et al. (1989) explain the deterioration of water quality of the Khan. The study shows that there are changes in the biotic communities such as phytoplankton, zooplankton, and macrozoobenthos. Through this paper, an attempt is made to explain that due to the increase in pollution there has been a decrease in bio-diversity of the Khan. In another research, by Samant (2004), identifies forces that underpin and threaten the valuable environment affected by the urban public realm of Ujjain. His research explains that the Ghats along the banks of the Kshipra because of its spiritual significance have become places of human congregation, thus giving rise to activities which vary from sacred to profane. He explains that while planning the ghats, it is essential to consider local planning, urban and regional uses. This study has been done using architectural perception. He suggests that the architects who plan these ghats use the western style of architecture which is not in sync with the environment and economic and commercial purposes.

Kumawat and Sharma (2015) provide the water quality assessment of the Kshipra. Its pH varies from 7.9-9.5, Biological Oxygen Demand (BOD) varies from 40 to 70 mg/l[31], its Total Hardness (TH) varies from 75-150 mg/l[32], Total Solid (TS) varies from 874 to 1214 mg/l[33] and

[31] Permissible limit of BOD is 30 mg/l (WHO, 2006)
[32] Permissible limit of Total hardness 20-40 mg/l (ibid)
[33] Permissible limit of Total Solid 874-1214 mg/l (ibid)

Total Suspended Solid (TSS) varies from 350-750 mg/l[34]. The study reveals that water of the Kshipra is not of good quality. Another study Rizwan et al. (2016) also provides similar details about the degrading water quality of the Kshipra.

A few papers have been written on the Khan and the Kshipra rivers, mostly are from the scientific perspective. In these papers, the authors talk about the increase in pollution of these rivers using biological, chemical, architectural, and geological perspective. None of the papers have taken into consideration the social, cultural, political and ecological perspective in detail. Therefore, this study is one such attempt.

Summary

Governance of rivers in ancient times was focused on water. Though rivers were considered to be holy then, but their governance was not emphasized much. The focus in ancient times was more on governing water than it was on governing rivers in India. The colonial period, the interest shifted towards revenue generation, construction of massive canals by manipulating untapped rivers and reconfiguring its hydrology. This period emphasized that rivers can be tamed through infrastructure development. Therefore, rivers remained only the source of exploitation. This ideology continued further in independent India.

Even though in independent India river boards were formed and tribunals were established but unfortunately their work patterns were quite different than the functions they originally had on papers. Furthermore, the programs which were created to manage the major rivers failed due to there focus being on towns rather than being on "subaltern" rivers, which ultimately form an upstream-downstream relationship as discussed by environmentalist like Rajendra Singh, Ramaswami Iyer and Ravi Chopra. The expenditure incurred on the programs

[34] Permissible limit of Total Suspended Solid 300-600 mg/l (ibid)

are huge, but the results of river degradation has not been very satisfying. The reason behind this is government of India follows the ecocentric approach i.e. government in India considers deterioration of rivers as an environmental problem, so in order to solve this problem it uses technocratic approach ignoring the depth of the problem.

Mostly the diverse scholarships focus on major rivers, and the "subaltern" rivers remain specific to pollution studies. Therefore, this study highlights that there is a requirement of a conceptual framework to study rivers in India. By establishing the broader perspective of rivers, a mind-map can be constructed through which emphasis reaches out to smaller tributary rivers which are the ones bringing waste to the major rivers. This mind-map will consider that each subaltern river has its sub-system and all these sub-systems are connected to each other. Hence, categorizing the minor rivers as "subaltern" gives them recognition and space in popular discussions so that the perspective in the field of research both sciences and social sciences could be explored

Chapter 4: Theoretical and Methodological Framework

This chapter elaborates the theoretical framework that was chosen to dwell into the study area. To provide the details of the theories used in the study, it is divided into five sections: 4.1 provides the details of the theories used in the study to highlight environmental concerns and power dynamics; 4.2 defines the idea of technography and explains its components used by various thinkers; 4.3 provides the need of technography in the case study chosen to apply the theory; 4.4 operationalises technography by using three components ethnography, biography and technology; and 4.5 discusses the methodology and methods used to perform this study.

4.1 Environmental concerns and power dynamics:

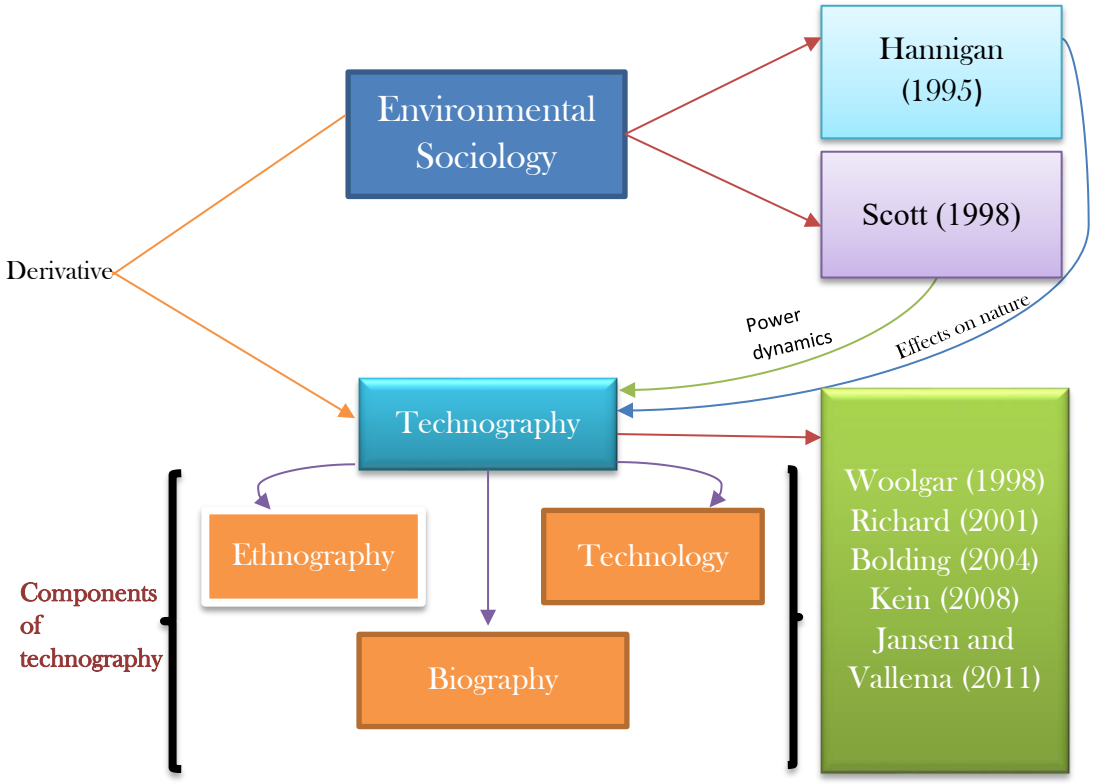


Figure 4: Locating technography in the sub-discipline of environmental sociology

This thesis positions itself into the sub-discipline of environmental sociology. With the help of Hannigan's (1995) work, it highlights the concerns of the environment which became evident after the 1970s. He mentions that the first explicit use of 'environmental sociology' was by Samuel Klausener (1971, p.4) in his book "On Man in His Environment". In his work Klausner engages in series of studies of human behavior. Another crucial contribution to ignite the environmental movement in sociology was Rachel Carson's (1962) book "Silent Spring". In her book she exposed the ecosystem damage due to excessive use of agricultural pesticides. Post 1970, contributions discussing environmental concerns grew in numbers such as Meadows et al. (1972), "Limits of Growth", Dunlap and Catton's (1979) focussed on environment society interaction, Beck's (1986) "Risk society", Catton (1980) "Overshoot: The Ecological Basis of Revolutionary Social Change", Mol and Spargaren's (1997) "ecological modernisation theory" are some of the notable contributions.

Further, Hannigan provides the necessary factors for the successful construction of an environmental problem. He mentions that a) environmental problem must give scientific authority to validate the claims. This explains that the claims made by the environmentalist must be confirmed through data provided by physical or life sciences (Yearley, 1992); b) requirement of technology evangelists who can popularise the scientific concern to real problems. This explains that there is a requirement of people who could propagate the use of technology through articles, talks, user demonstration, blogging or creating sample projects irrespective of the place of implementation; c) media attention which highlights the problem as novel and important; d) presentation of the problem in an interactive format i.e. through photography, sketches, enactments, and writings to communicate with people and get there feedbacks; e) displaying downfall in economic incentive, eg. scarcity of water would decrease food production; f) addressing these problems in the policy agenda and legislation. With these factors he also emphasizes

through the words of Stocking and Leonard (1990, p.42) the in-depth analysis of environmental concerns:

> "The environmental story is one of the most complicated and pressing stories of our time. It involves abstract and probabilistic science, labyrinthine laws, grandstanding politicians, speculative economics and complex interplay of individuals and societies. Most agree it concerns the very future of life as we know it on the planet. Perhaps more than most stories it needs careful, longer-than-bite-sized reporting and analysis now" (Stocking and Leonard, 1990, p.42).

Therefore, with the help of Haningan's (1995) writing, this thesis highlights the environmental concerns of the study region. It explains the factors responsible for making minor tributary rivers "subaltern" in the following manner: the cultural importance given to elite rivers in India provides them a position of goddesses. These positions provided to rivers, give them the higher power to correct human errors of overbuilding and interventions in her flow and purity. This results in floods or overflowing of the rivers swallowing its surroundings. These interventions are not limited to major rivers, but they extend more towards the minor rivers, due to the fading importance of minor tributaries as they lie far away from major rivers. The interventions made on such rivers lack the necessary factors for the successful construction of an environmental problem like water scarcity, increasing waste and health hazards. Even though for major rivers the climatic, hydrological, ecological and anthropogenic features have been described but the prevalent view of the river as the ecological system has not been floated well in India. Resulting to which the technological interventions on minor rivers lack technological evangelists. The presentation of the deterioration of minor rivers do not take place in an interactive format in India. This causes minor tributaries turning into drain and further disappearing. As explained in the above lines the depleting cultural importance of minor rivers and the lack of critical discussions on technological interventions on minor rivers shows that they are insignificant compared to major ones. The reason behind that is policies, schemes and programs are created in the name of major rivers and minor ones

are expected to be included in these schemes, but practically these minor rivers are not included as the part of major stretches.

Additionally, to address the power dynamics, this thesis uses Scott's (1998) understanding related to power. His work explains that the efforts of state can be examined as sedentarization. It is an attempt to make a society legible and to arrange the population in ways that simplify the classic state function of taxation, conscription, and prevention of rebellion. The design of cities and using the natural resource which could suit humans are part of this concept. He relates the development of a city to a homely analogy from beekeeping. The beekeeper decides how enlarged or contracted the size of the hive will be. When can the beehive be moved to a new location and above all extract out just enough honey so that the bees can survive winter successfully. Scott says it is analogous to how the state crafts its society. The patterns of arrangement of a society looks simple but it is tweaked in such a way that systems of taxation and conscription are viable. The discriminate interventions of various kinds are examples of such tweaks. For instance, relief for the poor, political surveillance and public health measures. He further expresses that this kind of arrangement is a pernicious combination of four elements. The first element is the administrative ordering of nature and society. The second element is high-modernist ideology. High-modernist means the muscle-bound version of technical and scientific progress. The growing satisfaction of human needs, the expansion of production, the mastery of nature and rational design of social order with scientific understanding of natural laws. The third element is an authoritarian state which uses its coercive powers to bring these high-modernist designs into being. The fourth element is prostate civil society that cannot resist these plans.

Scott's idea of power dynamics could be observed for "subaltern" rivers in the following manner: In various cities, minor rivers were used for fulfillment of human needs. Its utilization can be observed in the formation of a variety of industries on its banks. This further lead to the discharge of waste into the river

due to non-maintenance of sewage pipelines and STPs. The climate change and human interventions of extracting more water from the minor rivers made them non-perennial. It empties the riverbed for eight months, which allows the littoral residents to form colonies for themselves.

These littoral residents occupy the space of the riverbeds and are provided very few facilities by the local administration so that they can survive near the riverbeds and remain the part of such spaces as they are vote banks of local leaders. The local administration does introduce cleaning schemes for minor rivers during festivals like Kumbh Mela. But this only happens when such festivals are near. The government introduces technologies for delivering and diverting water from one river to another without realizing its effects on both people and rivers. This further deteriorates the situation for the minor tributaries as public awareness is less due to fading cultural importance of minor rivers in the public discourse.

In this study, both power dynamics and concerns of environment have been linked to technography which is also a derivative of environmental sociology. The next section discusses technography and its utilization in the study.

4.2 Defining technography

Oxford English Dictionary[35] (1881) quotes technography as the "observing and descriptive stage" of the technological development cycle (Kien, 2008). Collins Dictionary (2000) defines technography as 'the study and description of the historical development of the arts and sciences in the context of their ethnic and geographical background.'

Woolgar, (1998) defines technography differently as he starts at innovation. According to him, innovation as a process entails a change in a network of social relations. It expresses the changes in the set of identities, expectations, language, and beliefs held by a society. Therefore, he feels that innovation

[35] Online edition, http://www.oed.com/ in (Kien,2008)

sometimes acquires the status of panacea. It means that there is an agreement amongst people that innovation is good for society. The danger is that the society reaches a point where innovation becomes a necessary element of the society. This makes the society lose its sight of which innovations are good and which are harmful for the society. The networks through which innovation entails are called technology. Technology is a network of congealed social relations, and its notions reveal that these congealed social relations sometimes reach beyond the idea that technical and social must be considered together.

Therefore, technography is the method to tease out these congealed social relations embodied within technology. It reveals embodied social relations through close analysis of the process of development and implementation (ibid). It emphasizes on the analytical scepticism about what the natives have to express, but simultaneously commits to working closely with them. Woolgar uses ethnography to understand technography. He thinks that ethnography helps to retain some scepticism about what natives think their beliefs, language, practices, myths, and so on are. At the same time, it helps in developing and maintaining the dialogue with the subjects of the study.

Another author Paul Richard considers technography to be an eclectic methodology since "no single methodology will provide insight into all the entities and their interaction" (Richards, 2001). For him, approaches have to be derived from biosciences and social sciences. In other words, technography is always methodologically plural (Nuijten, 2011). He is said to have coined the term technography and explained it as 'a desire to develop an ethnography of technology based on empirical observation' (Ingold, 1994, p.336). Technography in this sense is a shorthand for 'analytical description of technologies, or studying technology for what it is' (Perrin, 1992, p. 10). Like Ingold, Richards (2000, p.19-20) aims to treat 'the tool, action, and agent as a complex package of embodied performative behaviors', adding a specific focus on the social organization of the task groups involved in developing and using the studied technology. The basic aim of technography is to understand

‘the engine room of technology, and its navigational process’. Richards (2000, p.24) wants to produce sociology of teamwork at all levels of the food production chain, from the laboratory to farmers’ fields, to understand ‘how task cultures shape (but also potentially squander) technological opportunities.’

In the context of Technological Studies and Sociological Studies of work and organization: ‘technography means describing the work in relation to technology as a specific social order. This social order is produced by interactions among the workers and their interactions with artefacts’ (Richard, 2000). In a similar vein, Knorr-Cetina (1999, Chapter 5) uses technography to analyze different epistemic cultures amongst scientists. It has recently been proposed as an interdisciplinary methodology for the detailed study of the use of skills, tools, knowledge, and techniques in everyday life. It is basically a methodology that needs to be complemented with a social analysis of concrete political, economic and cultural processes that co-evolve with technological change (Jansen and Vellema, 2011).

Technography is an ethnography of technology. The term technography is derived from ‘ethnography’ used in the social sciences to account for the detailed description of human-human interaction. Accordingly, technography can be regarded as the descriptive social science of technology that examines human-machine tool interaction. The principal aim is to facilitate research into shaping, use, and impact of technologies in the concrete social situation (Jansen and Vellema, 2011). While operationalizing it in agricultural production, they give three dimensions to this approach. They are: making (knowing how); distributed cognition (clearly defining the task) and the construction of rule (construct or transform set of rules in the process of making). Technography became a compelling methodological approach framework in the Technology and Agrarian Development research group of Wageningen University in 1980s (Jansen and Vellema, 2011). This group

aimed to foster interdisciplinary research in food, agriculture, and environmental sciences.

Currently, there has been an increasing interest with recent developments in technological capabilities which has stimulated sociological and anthropological concerns. Much of this can come under technographic approach as it follows Goffman's interactionist approach referencing classic texts like Behavior in Public Places (1963), Presenting of Self in Everyday Life (1959), Frame Analysis (1974), Relations in Public (1971). The work of following (Ling, 2004; Waskul, 2005; Humpreys, 2005; Golved, 2006; Katz and Sugiyama, 2006; Soukup, 2006; Robinson, 2007) explains the public-private performative aspects of human "technological contextualization of experience and congruent mobilization of electronic space". ANT (Actor Network Theory) (Latour, 1986) was the first approach which came in the form of "ethnography of technology", even though explorations in technography are recent, but in a way, it precedes ANT. Teleologically technography is considered the genre of inquiry to which ANT belongs. This methodological approach tries to build a relationship between society and technology (Kein, 2008). This methodological approach was introduced to coax socio-technical researchers to embrace the latest advances in qualitative research and to reconsider traditional assumptions about "dead" space and technology.

Many authors who have contributed to document technological experience through ethnography are Markham (1998), Denzin (1999) and Hine (2000). They explained the illustrations of electronic and virtual space. This could be very well observed in the work of Bolding (2004). Bolding by discussing state-engineered an attempt to modernize African agriculture. He explains socio-technical engineering with a technographic approach. According to him, socio-technical engineering is a link between technical objects and social actors that make society durable or non-durable. With the help of Scott's (1998) work "Seeing like a state", he identifies four critical ingredients that both informed and failed state-engineered plans to modernize society and improve the human

condition: administrative ordering of nature and society; high modernity ideology postulated by uncritical, unsceptical and optimistic belief of possibilities of comprehensive planning of human settlement and production; an authoritarian state that is willing and able to use the full weight of its coercive power to bring these high-modernist design into being; and, a prostate civil society that lacks the capacity to resist these plans. Hence in order to bridge nature-society divide he proposes new methodology which is technography. He uses this approach to tackle deficiencies in conventional analytical and policy perspectives on irrigated settlement scheme. He calls technography a new methodology because he proposes three components to study three models in Africa in the perspective of irrigated settlement scheme. The components were biography; ethnography and technology.

Technography so far is still expanding its understanding of how to create an interaction between society and technology. Bolding is one of the thinkers this thesis could find who talks about bridging the gap between nature and society in technography, but he discusses nature in the irrigation schemes that he has been critiquing in his work, and he talks about the false ideas of modernization that have been propagated in Africa so far. He does not discuss about hydrology so much to build interaction between society and technology. For this study water resources are essential elements of nature, society and technology, so it uses technography to explain that. While reading the literature on technography the study finds that there is no direct emphasis on hydrology, even though water resource is an essential element of agriculture, food and environmental sciences for which technography as a methodological approach came into being. Therefore, this study makes the river an essential and integral part of society and technology interaction and analyzes the case of "subaltern" rivers in the Madhya Pradesh region of India.

4.3 Need for Technography

Technography encompasses the research capacity of reliable technology to be employed in a particular sector and how it blends with the society. Through

technography, this study highlights the reason, role, and result of a particular technology. In most cases, the effect is unilateral, and a particular social dimension is exposed. In case of water, the social dimension gets broader because of the complex human water interaction. Hence, technology applied in the water sector needs to have an additional component of the water resource.

Technology, every time, can't be holistically acceptable. It has its pros and cons, known to sections of society. Water resources, especially rivers, play distinct roles for all the stakeholders directly/indirectly connected with them. It evokes specific economic, social, political and cultural power dynamics for each one of them, as an individual as well as a social group. For them, any technology associated with this will have different meanings. It is widely observed that rivers, which have/had a broad characteristic of being efficient social organizers, have fallen under the hand of various claimants, over the period of time. Choices of water-related technology by a particular group of stakeholders represents the tilt of power dynamics in that particular society.

In this situation, effective recording of views of various claimants at the time of intervention being made through technology can provide a complete picture of the effect of that particular technology on the existing human water relations. The insertion of water resource as a permanent component, while recording the views will help explain the multi-linear social relations developed through that technology.

The governance of rivers through technological interventions remains an important sub-set of comprehensive socio-political and cultural structure of everyday river governance. The major contributions of any specific events arise from immediate social, political or cultural requirements that accelerates the speed and magnitude of technological intervention. Therefore, this study proposes a conceptual framework of technography through which one can understand the process of governance of rivers in India.

4.4 Operationalisation of Technography

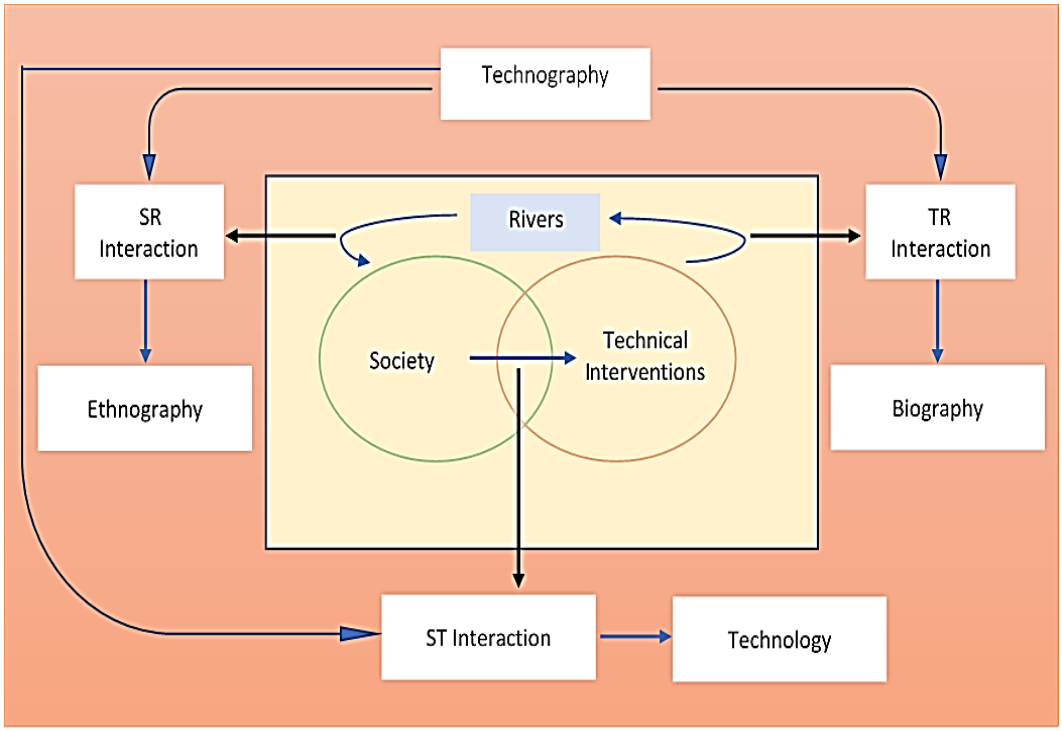


Figure 5: Conceptual framework of technography

While discussing technography in section 4.2 and 4.3, we get to know that the various thinkers feel that it is an interaction between humans and machines keeping in the background the nature. But this study emphasizes the importance to bring nature at the forefront, i.e. nature must share a linear relationship like society-river-technology. This means that there is a pressing need to emphasize on the equal interaction between all the three. To understand this interaction like Bolding (2004) did, therefore, this study uses ethnography, biography, and technology as the components through which research capacity can be build of using reliable technology which blends with society as well as rivers. Further, the study explains these three components in greater detail in the way they have been utilized to elaborate the degradation of minor rivers.

a) Ethnography-

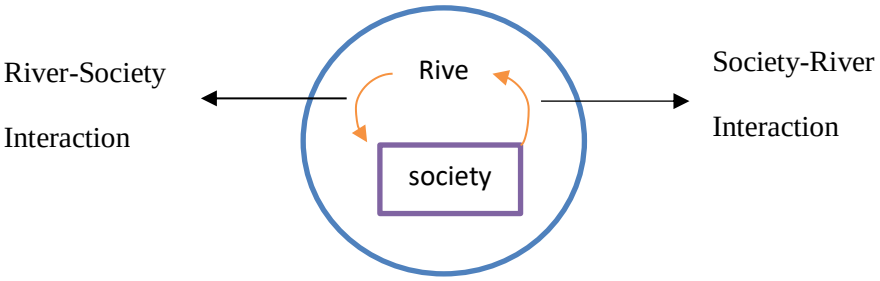


Figure 6: Description of analyzing ethnographic data

The ethnographic analysis in technography requires interaction between two living[36] entities and their relationship. Ideally, it has to be two-way interaction in which rivers provide water to the society and society maintains the river using various environmental techniques. River Khan's interaction with Indore city has transformed the river into sewage due to the excessive one-sided interaction between rivers and humans. This thesis studies this interaction as socio-natural (Swyngedouw, 1996, p. 66) due to malleable, transformable and potentially transgressive interaction of society and nature. This means that socio-natural relations are weaved through networks that permit re-casting modernity as deeply geographical although by no means coherent, homogenous, total or uncontested projects (Swyngedouw, 1999). It further explains that the networks that constitute the processes that produce socio-natural hybrids where natural and social are seen as two contradictories, yet complementary poles that construct a reality (Swyngedouw, 1999). This means that "social relations operate in and through metabolizing the natural environment which, in turn, transforms both society and nature and produces altered or new socio-natural forms" (Grundman, 1991; Benton, 1996)[37].

[36] This study argues that ecology of the river gets affected by the anthropogenic activities that takes place in and around the "subaltern" rivers. A river interacts with each and every organism that it comes across therefore it is considered a living entity. So, in order to understand the interaction of river with the society this thesis studies the said interaction using ethnography which is one of the components of technography.

[37] In (Swyngedouw, 1999).

This component has been one of the processes in this study through which the thesis arrives at an understanding of the place a river holds in the lives of people today. It was facilitated by studying the river communities. Through detailed interviews it could be known that "subaltern" rivers have been converted into a sewage and garbage dumping site, they still hold a prominent place in the lives of people by giving them space to live, by helping them perform their cultural practices among others. For instance, there is a ghat called Ghanghor ghat on the banks of the Khan where the drops of dirty water are still used at the nights of the full moon to fight evil. When exploring the daily interaction between humans and rivers, this study observes that humans became so busy with their daily activities that they forgot their responsibility towards the rivers which was once providing them with food, drinking water, occupation, irrigation facility and so on. To discuss the environmental degradation of the rivers by humans, this study uses various theories of environmental sociology to explain the same. Inferences related to ethnography are detailed in Chapter 5, section 5.1.

b) Biography-

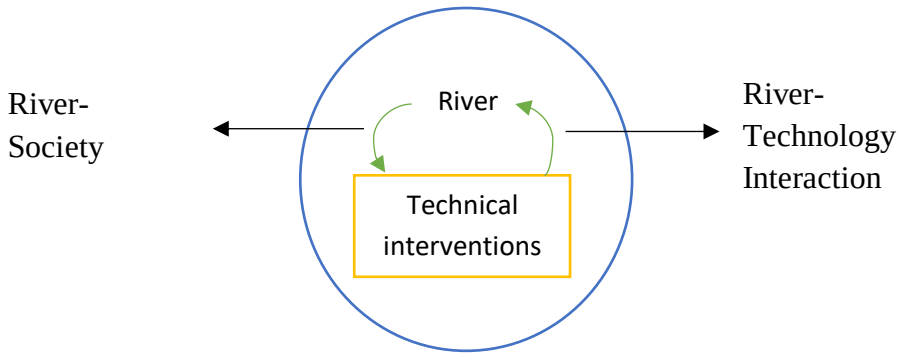


Figure 7: Description of analyzing biographic data

The biographical analysis that is used in this study discovers the two kinds of interactions. The first interaction is amongst society and river. This interaction produces knowledge related to the kind of technology

required to utilize water resources like rivers. Second, the society in order to fulfilI its requirements uses technical interventions. These technical interventions and their applications on the rivers can be studied through biography as it details the past interactions with the technology and their effects on the society.

Using the component of biography this study explains the technical interventions that were once introduced by the society to use river water. This happened when human settlement started on the banks of the river. As society transformed, these technical interventions increased. The increase in technical interventions altered the importance of the river from a lifeline into a garbage and sewage dumping yard. This led to further technological interventions that resulted in the disappearance of the "subaltern" rivers.

With the help of this component, the thesis explains the political status of minor rivers. The in-depth analysis of the background of river Khan and Kshipra proves that the minor rivers have a political status which does not let them become fully a drain or a river. This inference could only be understood by knowing the water supply system, slum sprawl, cleaning projects and altering holy status of the minor rivers. The way these rivers have been exploited shows that the local government has failed to solve a foreseeable problem and lacks preparation for its conjunction with extreme rains and flood events. The infrastructure created around such minor rivers is natural terraformed landscape where nature and culture merges to produce a landscape of construction, debris and altered habitats (Alley, 2015, p.410). This gives rise to shift in budget on construction of landscape than looking at the transformation of river into sewage or garbage dumping site. This affects the life and death of the minor rivers.

c) Technology-

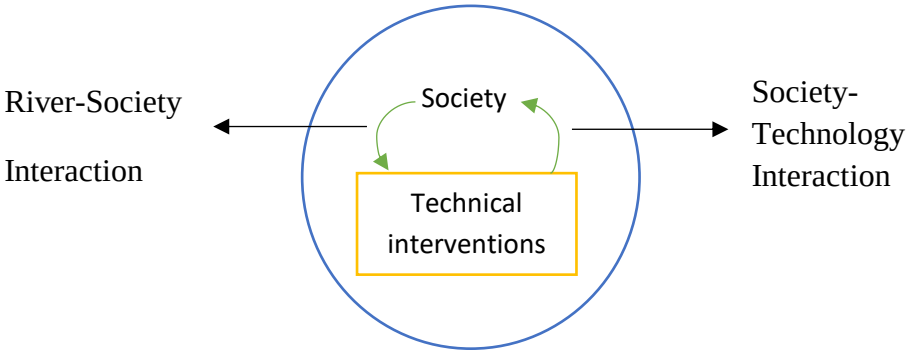


Figure 8: Description of analyzing technology

Technology, the third component of technography helps us understand technical interventions which can fulfill the societies requirement to use the rivers efficiently as well as sustainably. But technology is a complex component. It requires a thorough understanding of the relationship between rivers and society by using both technical and non-technical components. This is to ensure that rivers as a resource are not over-exhausted ending up dry. The component of technology is understood through Scott's high-modernist ideology. It is conceived "as strong, one might even say muscle-bound, version of the self-confidence about scientific and technical progress, the expansion of production, the growing satisfaction of human needs, the mastery of nature (including human nature), and above all, the rational design of social order which commensurates with scientific understanding of natural laws" (Scott, 1998, p. 4). This ideology was borrowed in such a way, as it were, the legitimacy of science and technology. It was accordingly unskeptical, uncritical, and thus unscientifically optimistic for the comprehensive planning of human settlement and production.

At present technology has become an essential element through which society interacts with all that is around them. Technological

interventions today have become as essential as breathing. But these interventions to an extent have reached so far, that it has in a way alienated the humans from the environment around them. This study discusses the projects which have been used to manage the social problems of deterioration of the Khan and the Kshipra rivers in Madhya Pradesh. It argues that although the projects focus on sustainability, they end up causing more strain on rivers. Technology as a component cannot be understood well if we do not incorporate other two components (biography and ethnography) to address the deterioration of the rivers. Society-technology interaction without including biography and ethnography becomes technocentric and so it only uses the technocratic approach to solve the problems rather than focusing on socio-nature approach i.e. understanding the intertwines of nature and society.

4.5 Methodology and Methods of study

Methodology helps in building a perspective through which one can observe the world. It tacitly declares the academic position and informs the readers on the idea of 'valid' knowledge. Therefore, the choice of methodology expresses our political action that provides a structure to the research process, which further gives us an edge to choose a specific world. The fundamental idea behind the research is to express the reality that is out there in its highest possible accuracy, knowing that society is complex and heterogeneous in nature including river governance and sociotechnical interventions. Before this study would analyze the social problem, it is necessary to express the way problems are studied in the academic world. Dilthey (1985) said that "Human beings that they themselves spin. To understand humans, he argued we need to understand the meanings of these spins". This argument is carried forward by seeing the acts of the humans to understand how they shape the reality. Hence this study uses theory-centric method of

inquiry. It uses technography to understand the social reality of the "subaltern" rivers in India.

Technography for this study is built on three methodological principles: 1) critical theory; 2) interdisciplinary; 3) case study method.

1) **Critical theory-** It is used to designate the Frankfurt School. It begins with Hokheimer and Adorno and stretches to Marcuse to Habermass which means that any similar theory which examines human domination can come under critical theory. This theory identifies varied dimensions of domination of humans in modern society, exploitation of rivers is one of them. Therefore, this study critically examines the domination by human beings through technology to tame rivers. Using the critical theory helps the study to provide the normative and descriptive basis for social inquiry. The aim of this theory is to decrease domination and propagate equality. This theory not only provides means to achieve the goals but rather seeks "human emancipation" in circumstances of domination and oppression. It is practically possible to use this theory through interdisciplinary research. Technography as a theory in this study is based on interdisciplinary research.
2) **Interdisciplinary-** It has been used to emphasize that while dealing with a social problem like the deterioration of the rivers either social determines technical or technical determines social. This kind of monodisciplinary reductionism strongly influences the increase in deteriorating rivers. But if one studies them together including nature, it will not only help in analyzing physical, chemical, biological, economic needs but will also analyze social, political, cultural and environmental needs.
3) **Case Study Method-** It helps us understand and explore the complex issues. It facilitates the holistic, in-depth investigation. This method provides the researcher to look beyond the quantitative statistical

results to understand the behavioral conditions through the actor's perspective. It helps to explain the process and the outcomes of a phenomenon through reconstruction, observation, and analysis of the cases which are investigated (Tellis, 1997). It has been used in the field of sociology by Grassel & Schirmer (2006). It gives the true essence of real-life phenomena through contextual analysis of certain events or conditions and their relationship.

4.5.1. Research Techniques

This study uses the ethnographic method to understand how rivers flowing through the city turned into a *nallah*. Following this method, it could explain the idea of "subaltern" rivers from the standpoint of participant observation (Burawoy, 1998, p.6). Participant observation, interviews, and photography were the main techniques which helped in collecting a major part of the data. Once in the field, the study recorded all the information related to the two minor rivers and their governance. The daily visits to the communities around the Khan helped in understanding their relationships with this minor river. Walking through the alleys where only a part of the river was visible gave the study an idea of how construction has taken over many tributaries of the Khan and the Kshipra. In this process of data collection, the study kept a follow up through local newspapers.

This study could also attain experience through an NGO where the author of this thesis worked as a supervisor and helped take interviews in the field. This NGO was named as Taru Leading Edge. The author worked under the guidance of Mrs. Megha Bharvey and Mr. Amit Kumar. Three months of work under this NGO rigorously involved the author with the communities which were mostly affected by flash floods and water-logging in Indore. This study extended its discussion to voluntary organizations like Abhyas Mandals which were working

on rejuvenating the rivers. It interviewed few honest officials who could elaborate on the changed status of the minor rivers.

Further to know about the cultural practices of the "subaltern" rivers the author visited Kumbh Mela organized on the banks of Kshipra. During the visit to Kumbh Mela, this study analyzed two major projects that were introduced for these rivers like the Narmada Kshipra Simhastha Link Project (NKSLP) and the Khan Diversion Project (KDP). The process of fieldwork completely engaged the author with the rivers, and this made the author the part of their story. The details of the fieldwork have been provided in Chapter 5. It is an account of the projects, which took over these rivers, the involvement of community and engagement of government.

4.5.1.1 Selection of the cases

This study presents a brief argument of the cases of the "subaltern" rivers that were chosen to investigate the mechanism of technography. The Khan and the Kshipra were chosen as cases to understand how rivers are governed in India. These rivers have been categorized as "subaltern" in this study because they have been sufferers of socio-technical interventions that took place with the expanding cities on their banks. Further, they are linked with major rivers like Ganga and show the kind of neglect minor tributaries are facing even though they are part of major rivers. After the selection of the cases the following techniques were used to collect data:

a) Sampling: The study uses representative sampling to present the conditions of the "subaltern" rivers. Through representative sampling, this thesis discusses the experiences that could be collected by meeting people in small groups who narrated their stories about these rivers.

Some of them also talked about the beauty of the river 30 years back in the form of conversation with one another. Their interactions with each other helped the study know how the people living in various communities enjoyed their childhood near the banks of a beautiful river which today is nowhere close to what it was in the past.

b) Data Collection and analysis: It was divided into various stages:

Stage 1- Literature review which discussed the increasing pollution of rivers. Then it looked at the kind of work that has been done on the Khan and the Kshipra rivers in Madhya Pradesh in terms of policies and programs. Through the literature review, this study could get an idea of what kind of data was required to pursue a study in this field. This gave an idea to the study that it requires two kinds of data: i) project details, documents, policy papers and newspaper reports which could help in developing the problem of deterioration of rivers; ii) participant observation, field notes, interviews, local opinions, and ideas.

Stage 2- In this study, data was collected through semi-structured interviews. The entire process was to know how the government has failed to govern the "subaltern" rivers flowing through the cities. The study used quantitative data to support the qualitative data available for this study. While taking the interviews, the intentions were to talk to as many people possible during regular field visits.

Stage 3- The collection of the data from the interviews and reflexive participant observation was organized and filtered for its relevant content. The main concerns and issues of each interview were condensed to locate the findings.

Stage 4- The data was filtered from the information gathered within the analytical categories of governance issues, institutions, and people. The analytical categories of governance issues, institutions and people were assigned codes and memos based on pre-existing theories. The process of coding and comparison of the two cases was facilitated by the research software called Atlas.ti-5.

Summary

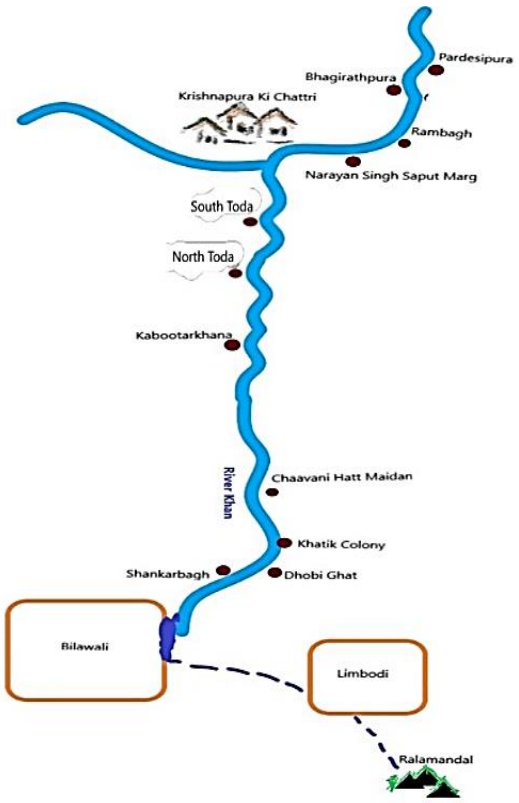
This Chapter has outlined the theoretical framework that has been used to analyze the data collected to study the environmental degradation of two rivers the Khan and the Kshipra in Madhya Pradesh. At first, it begins defining technography and then explores the extent to which it has been used in the former research. Then it explains the need for technography to bring the water resources from the background to the forefront. Further, the study operationalizes technography into the case study with the help of its three components ethnography, biography, and technology.

In this chapter, the thesis discusses the methodology, and methods of the study used through which application of technography could be possible to the cases studied. It discusses the research techniques which could help get the data from the field. So, with the help of the theoretical framework and methodology, the next section provides the analysis of the study. It analyzes the reasons for the disappearance of the river. It also provides the reason of depleting cultural significance of Kshipra which is one of the reasons of this river falling into the category of "subaltern".

Chapter 5: Analysis of the Study

This chapter brings forth the insights from the fieldwork. Using Hannigan (1995), it scrutinizes the environmental concerns, to show the effects of the expansion of cities on natural resources like rivers. It also applies the understanding of power using Scott (1998) to demonstrate the local government's interventions to concord the problem of deterioration of the rivers in India. For this purpose, the chapter is divided into three parts: the first section elaborates the analysis of ethnographic data collected on the banks of river Khan in Indore city; the second section proffers the analysis of Khan Diversion Project under the subheading 'Khan from pollution to diversion'; and, the third section presents the analysis of Narmada Kshipra Simhastha Link Project under the sub-heading 'the changing contours of Kumbh Mela'.

5.1 On the banks of river Khan



Map 7: Schematic diagram of the study areas

This section discusses the analysis of ethnographic data collected on the banks of the Khan. At present, out of the four tributaries[38] from where the Khan flows in the city of Indore, this study chooses one stretch, i.e., Ralamandal to Pardesipura. Map 7 shows 15 places[39] which have been covered for this study and falls under this stretch. The section illustrates the environmental concerns of the study region.

Increase in industries causing pollution of the river: As industrial revolution proceeded through the eighteenth and nineteenth centuries, rural workers were removed from their native lands and driven into crowded, polluted cities where the soil itself was drained of its vitality (Parsons, 1977; p.19). Single factor capitalism was held responsible for a wide range of social ills from overpopulation and resource depletion to the alienation of people from the natural world with which they were once united (Hannigan, 1995; p. 8).

Some excerpts from the fieldwork that express the effects of industrialization on the "subaltern" river Khan are: "Mr. Qureshi, a resident of Moti Tabela informed in an interview that thirty to forty years back he had horses which drank water from the river. Vast, the river reached his backyards, and elephants and other animals were also seen wandering around the banks of the river which today have been covered with construction. In Shankarbagh an engineer with the help of other workers was found connecting the water of 6 *nallas* to the primary sewage link. He expressed that this initiative was to link these *nallahs* which were flowing from the areas of Azad Nagar, Palasia, Bhamauri, Piliyakal, Tulsinagar, and Shakkarkhedi which had 468 outfalls into the river and there was a requirement to link these to the secondary project so that Khan could be revived. Umesh Dixit, a pujari of the Devi Mandir (temple of the

[38] Rao, Nihalpur Mandi, a channel that links Bilawali, Limbodi and Pipliyapala, and, Ralamandal (Patrika, 2014)

[39] Ralamandal, Limbodi, Bilawali, Shankarbagh, Dhobi Ghat, Khatik Colony, Chaavani Hatt Maidan, Kabootarkhana, North-Toda, South-Toda, Krishnapura ki Chattri, Narayan Singh Saput Marg, Rambagh, Bhagirathpura and Pardesipura.

goddess) which is in Shankarbagh, expressed that the *Devi mandir* had a ghat dedicated to the temple 40 years back, where people took a bath, sleepover and even sailed in boats. But eventually, the temple had to be relocated from its actual place due to the deteriorating condition of the river. He told us that governments initiative to construct pipelines near the river to carry the sewage from households, colonies and the industries outside the city is responsible for the degrading condition of the river. The pipelines constructed so far are mostly broken which makes the sewage fall into the river. He also expressed that direction of the river has also shifted due to illegal constructions on the banks of the river. According to him, only sewage pipelines are not the problem, but the formation of small-scale industries which are discharging their waste into the river are also highly problematic.

Photograph 10: River Khan near Shankarbagh

Another respondent in Shankarbagh named Aruna, who was 15 years old, informed about the river that her grandparents described its beauty which they had seen when they were young. She also mentioned that they told her that during their childhood the river was very clean as it was used as a means of transportation and occupation. But now the river is only the garbage and sewage dumping site. She recalls that one of the elders of her family was into the profession of boating which slowly diminished as the livelihood patterns changed. She compared her occupation to the ancestral occupation saying that only meager money could be obtained through boating while working as labor

in the nearby factories or selling goods like vegetables, fruits, etc. help earn way more."

These excerpts are taken from fieldwork to provide few examples to show that condition of the Khan in Indore has been affected by increasing industries on its banks. With the advent of industrialization, the city of Indore has gone through rampant commercialization leading to the pervasive discharge of untreated sewage and the widespread dumping of solid waste into the rivers and on its banks. Riverbed encroachments have affected the sediment flow, deposition rate, and river flow. When a river flows freely, the amount of sediment it carries gets adjusted in the broad area of its path, but due to encroachments and construction on the river bed, the direction of the river gets fixed and is narrowed down which leads to frequent floods even though sometimes the region sees scanty rains.

Despite the construction boom, housing supplies are insufficient to meet the overwhelming demands of migrating people and rent prices have become inaccessible to many. For new drifters and poorer city residents, participation in the current land and housing market is impossible, and as a result, the vast areas of exposed riverbed are chosen as alternative spaces for settlement. The large population of migrants in riparian zone is often included as a factor of river degradation.

Health hazards: The study infers through field visits to the stretch that the water of Khan drain was affecting the health of not only the communities but the general public too. Some of the health challenges that people were going through on the banks of this river can be expressed through following excerpts: "In Shankarbagh a respondent's daughter (Photograph 11) was suffering from boils all over her body. The doctor's recommendation suggested that it happened as she was exposed to dirty water.

Photograph 11: Boils and itching are the common diseases near the river

In Khatik colony, the study observed the pig rearing process close to the river; this practice was very unhygienic. The pigs were let free to roam around the stream of sludge and garbage dumped in Khan river. It was also observed that these pigs were consuming, and ingesting garbage drenched in this toxic black sludge. This pig meat produced in this virulent environment is also sold to the public, thus leading to conclude that the toxic condition of the river is not only detrimental to local communities, rather it has a wide scale impact on the city.

Photograph 12: cages for rearing pigs

In South-toda, a respondent named Pyarelal, who was 50 years old was suffering from the symptoms of elephantiasis which he thought was the reason of the dirty water, as it became an adobe for mosquitoes. In Rambagh, a respondent informed that during rains itching and viral fever are common

health issues. Also, the villagers of Bhagirathpura and Pardesipura grow crops using this water, which was is one of the health concerns of the larger population of Indore". Therefore, these observations suggest that the river converting into the drain is not only affecting the communities living close to it but is affecting the population residing away from the river.

The state of the river determines the prices of living: During the fieldwork, the study found that the clean water of the Khan attracts posh colonies facing Ralamandal hills, Limbodi and Bilawali tank. For instance, colonies like Silver Spring Phase I and II, Lake Vista, Ranibagh colony, constructed near the clean river are costly and affordable by rich. This can be understood through the excerpt from the field data: "from the Ralamandal Hills, an almost bird's eye view of the evolving landscape can be observed. By standing atop these hills, one can witness how green landscapes are being taken over by gated communities. It can be observed that development has slowly taken over this area, the occasional lush green fields invariably catch the attention of the viewer. Staring the journey, passing through these lush green fields, one can reach Limbodi lake also known as Limbodi tank. This lake covered 150-200 acres of the land and was developed by the Holkar dynasty for fulfilling the water needs of the townspeople. It gets filled by rainwater and groundwater, and as a result, the water level in this area has only dropped till 100 feet (c.f. Tiwari, 2016), and the regions in its proximity do not face a water crisis. This has led to the formation of an enormous number of townships. The entire vicinity of Limbodi Tank is surrounded by farmlands, Kasturba trust organizations, and diverse colonies. It is also the source of water for different rivulets which arise from Limbodi tank and forms the part of river Khan.

Photograph 13: Limbodi Tank visible from Ralamandal Hill

Walking the stretch of Limbodi tank one can reach Khandwa Road, which connects Tejaji Nagar and Bhawar Kua, also known as State Highway 27. Map 7 shows the extended stretch of Limbodi Tank which reaches out and eventually meets the Bilawali Tank. From Limbodi and Bilawali tanks, smaller streams arise, and they drain river Khan which is spread into the city. These smaller streams are hardly visible in the hustle and bustle of the city as most of the area is covered by colonies, shopping complexes, institutions, training centers or restaurants. One can however occasionally catch the alleys that remind one that the river flowed at certain spaces. While in cities where the river is full of sewage and garbage provides people place to stay only in the filthiness of the river. For instance, Aruna has recently shifted into a rented house and pays Rs 400, Asmita another respondent from Shankarbagh pays Rs 1000 for staying in the rented house. Seema, another respondent from South-toda, pays a rent of Rs 500. For the littoral residents staying beside the river, the rent still is very high as their occupation only provides them an amount exceeding up to Rs.5000-10,000". The rent patterns of these two areas are different, the residents of silver spring which is close to Ralamandal hills have to pay Rs 7000 as rent per month which is still affordable for them, but the people living on the banks of dirty river Khan have to pay Rs100 to 2000 per month which is quite expensive for them. This pattern reveals that the condition of river decides the amount of money that will be paid as rent as well as it also decides who receives access to clean water and who starves close to

the dirty water. This distinction in access to the resource can be linked to the theory of Ricardo (1821) of differential rent where he says that state of land (good, ordinary, bad) decides the amount of money people have to pay as rent. This theory has been used here to explain the determination of the land prices due to the bounty of nature.

People are both 'victims' and 'perpetrators' (Lockie, 1997): This idea of Lockie (1997) expresses that for the exploitation of resources people become both 'victims' and 'perpetrators.' While interviewing this stretch of communities living on its banks two different cases were found based on this idea. In the first case, the river and its communities are the victims of sewage generated from the industries, markets, domestic areas and various institutes which are created to facilitate the increasing population in Indore city. For instance, in the areas of Bhagirathpura and Pardesipura are the villagers living from the Holkars time and have been using the water of the river for agricultural purposes but even now when the water of the river has become a drain they still use it for irrigating their lands. They have been opposed many times by the local administration, but they have continued this practice. This can be proved through the following excerpt from the fieldwork conducted in villages of Bhagirathpura and Pardesipura where respondents have been marked in numbers due to privacy concerns, "Respondent 3's family grew crops even before he was born using the water of the Khan river. He looked around 35-40 years of age. During an inquiry with him, he kept himself occupied in washing the vegetables, and when he was asked why the locals are so petrified of giving interviews, he narrated a peculiar incident. In the past, a few newspaper reporters came to their locality disguised as ordinary locals, collected all information and next day all their fields were destroyed by the administration saying that they use toxic water of the Khan drain. As the conversation proceeded with him, suddenly all the other villagers formed a circle around the respondent and the research group. Some insisted on breaking cameras and throwing the voice recorders as they were expecting news reporters. The respondent approached them and said, "they are not reporters,

please calm down…" He informed the group that this study was an attempt to know about river the Khan and the experiences of people as the establishment of industries took place. Respondent 4, an elderly had tears in his eyes when he almost murmured, *"*what have we done that the administration ran a bulldozer over our vegetables." He reported that they were living in these villages since Holkars time. They were farmers then and so they continued their practice of farming irrespective of the change in the quality of water of the river Khan. Respondent 4 also stated that industries were established only 25-30 years back. Its the administration's responsibility to keep a check on industries on their waste into the river; why are they targeting the poor farmers. For the farmers living in the villages of Bagirathpura and Pardesipura, the Khan is the only source of water for their crops, while all other sources like pipeline and pumps fall short in fulfilling the water requirements".

In the second case, communities are the perpetrators, and the river is a victim. For instance, the Dhobi Ghat area near the Khan river. The fieldwork conducted revealed that as the process of cleaning of the clothes took place the wastewater was spilled into the river. In the areas like South-toda and Kabootarkhana people were found defecating in the open due to non-maintenance of public toilets. This can be shown by the following excerpt from the fieldwork, "One of the elderlies, Mahesh (60 years) voiced his observation about the river. He said that people are responsible for making the river dirty while pointing out the bridge from where they unthinkingly throw things into the river packed in polythenes. For him, the responsibility lies both with the government as well as with the public. He specifically pointed out that even though people are educated today, their habits remain the same, and they throw garbage into the river without worrying about its dismal consequences. Laveen and Harish who have just started working as washermen spoke about the huge machines bought by the families working at the Ghat. The process of cleaning clothes on the banks of the river was found with dismay that knowingly or unknowingly, the *dhobis* discharge all the wastewater into the river.

Irrespective of their share of discharge being contributed to the river, there is no way to deny that this occupation is their only ways and means to earn".

In both the cases, the exploitation of the river is visible whether it is through industries or communities. The river remains quiet for eight months, suffers all that comes through but during the rainy season it flows with all its water and drowns whatever comes its way. Excerpts from the field work are the proof of this observation: "Chandabai, 35 years old a resident of Khatik colony, talked about flash floods and its effect on this community. She expressed the tragedy of her family and informed that once the water drowned one of the sole earners of her family. After which she had to start selling vegetables to support her family financially in addition to pig rearing. Another resident of this enclave, Mala, who was 20 years old living in this area after her marriage for the past 10 years, informed how a month ago they had to run away from the house to save their lives because the entire locality got submerged by the river water. Satish, also a part of this locality for the last 40 years, recalled the day of flash floods. It was the dreadful July 21, 2015 (c.f. SWSPL,2015)[40], when the water level rose up to 10 feet and he along with his family had to rush to the rooftops of their buildings. He said that the government did nothing for them; as people had to run and save their lives and grains. Even though he knew that staying close to the river was not a very good idea, but for him, it was the only affordable option they could find in the city". These excerpts provide an account for people being both victim and perpetrators for the river which lies decaying in the backyards of the city.

Drain as a facilitator: Being dry for almost eight months this river only carries sewage. Hence it becomes a facilitator for the poor. Like for a respondent in South-toda, this dirty river has provided him a place to live. Interestingly, another respondent near North-toda who had a business of making mud

[40] SWSPL. (2015). "Heavy Monsoon Rains Continue to Lash Madhya Pradesh, relief In Next 24 Hours". Weather News and Analysis, Skymet.com. Available from: https://www.skymetweather.com/content/weather-news-and -analysis/ujjain-bhopal-and-indore-receive-recird-rainfall-more-in-the-offing/.

figurines of Hindu gods during the different seasons of festivals, mentions how helpful river has been for him even today.

For making figurines, they don't always require decent quality of water; hence the dirty water works out for him. For the initial stages of making statues and idols, they use the Khan drain. This reveals that once this river was used to take a bath before performing rituals on its banks as it was considered to be pure, today it has converted into a drain, hence it is polluted. Even though its water is not directly used anymore for purity related rituals, it is used to create figurines of god that would be treated as pure and worshipped by the people. These observations could be made by following excerpts from the fieldwork, "Though the river has turned into a sewage dumping site, it is still helping some people living on its banks. As an interesting offshoot, the study came across this affirmation from a few respondents living near North- Toda. Chetan Verma who has a business of making mud figurines of Hindu gods said that the river has been very beneficial to him even if it is in bad condition. In making figurines of mud, they don't always require fresh water; the dirty water can also come in handy. During the initial stages of making statues and idols, the river water is workable even though under the bridge, the statues and idols get dry very easily. Chetan and his family have been staying in North-Toda for the past 30 years, making such figurines and idols. They get a contract from nearby shops which sell these mud figurines, and his business requires a lot of labor work. He earns almost Rs. 800 for one statue.

In discussion with an elderly Ganga Ram who has been staying in South-Toda for the past 25 years has only seen the water of the river expanding during rain causing harm to their homes. Rest of the year the river remains as nothing more than a carrier of sewage and almost bundled up in a very narrow area in front of their homes. He comes from Dewas, a district of Madhya Pradesh which is an industrial area and couldn't offer him a place to stay or work. He finds it more comfortable to live in Indore as small occupations like rag-picking and laborer work are readily available. Besides, he poignantly said that the river

never asked him to leave, the river adjusts with him no matter what, but his family in Dewas could not.

Tulsa Bai living just under the Sanjay Setu bridge which links South-toda and North-toda was very elderly lady lying below the bridge, on a torn mattress. When asked how old she was, she couldn't recall her age nor where she originally came from or when she came to Indore. She seemed to be around 70 to 75 years of age. She just said that she is a ragpicker. When asked about the river, she said, the river is dirty, but it is the only source which has provided her a place to live. She worships the river so that it would not spill her anger on her family who stays under the bridge. She lives with her husband while her sons live in the other parts of Indore. She is accompanied by a couple of other families all living under the same bridge. When asked how she manages during heavy rains, she said that they go to the nearby temples or mosques who offer them food and place to stay".

These excerpts explain that even though the river has turned into a drain, it still is a facilitator for many littoral residents who find space close to this river.

Administration's response towards loss of a local river: In discussion with an engineer working on behalf of IMC, it was informed that the local bodies were trying to connect all possible sewage lines to chambers through which sewage can reach the STP rather than finding its way into the river. In another interview when the administration is inquired about the encroachment of people on the banks of river Khan, they categorically retort mentioning local administration has tried to relocate them, but they are so 'lazy,' 'unenterprising drinkers' that they do not want to change their way of living. Discussions about the Khan are always diverted by administration explaining that local newspapers are filled with articles informing the public about what is the IMC doing to revive the river. The problem the administration faces to clean local rivers is the hierarchical status of funds transfer. This can be understood through this excerpt, "Kanhaiya, a resident of North-toda, mourned the fact that one of his family members died a month ago due to water abruptly filling

up the house during the late night. Walking the river stretch, this study understood the way through which these people adjust to the river and risk their lives to get some sustenance for survival. If one peeps into their homes, one can find five or more people cramming up in a space suitable only for one or two. The stretch that was covered in this study speaks of normalizing poverty through strategies of avoidance. People die in these localities during rain, and local politicians can only argue why they were occupying the river bed in the first place. In discussion with one of the officials of IMC, it was explained that his organization had worked hard to relocate the littoral residents staying near the river and give them better facility with the help of state government, but they invariably return to such vulnerable places. The study inquired about the unequal opportunities and market strategies to drag people from various places in such vulnerable areas, to which the administration categorically retorted saying that his organization is trying to do the best for these people, but these 'lazy', 'unenterprising hard drinkers' just would not change their ways of life.

Straight questions of whether the Khan should be declared a drain, administration responds negatively. But when it comes to people of Bhagirathpura and Pardesipura using this toxic water they mention; the health of Indore city would be affected by these vegetables. This can be proved through this excerpt from fieldwork "In conversation with the administration on Bhagirathpura and Pardesipura, when it was asked why were the agrarians stopped from farming near river Khan, they said Section 144 of CrPC bans cultivation of vegetables on the sides of a *nallah*. When asked if Khan has indeed been declared as a *nallah*, they responded negative but reiterated the fact that the water of the river has turned toxic due to nearby *nallahs* seeping into the water body of this river. The message marked by this prohibition was aimed at people to understand that growing crops in such a toxic environment will affect the health of the entire city. When inquired if any corrective measures could be taken against industries and domestic waste being discharged into the river, the response of the administration was, Indore is trying hard to revive Khan river. The tendering process of laying pipelines

leading the waste to ATP (Affluent Treatment Plant) was on. The pipes to be installed promise to have individual meters that will calculate the amount of sludge released by every unit. An estimate of Rs. 1.5 crore on chemicals and 2.50 crore on labor and electricity will have to be spent on the ATP on a yearly basis (c.f. Mekaadi, 2017). Inquiring the administration on whether they spoke to the farmers about using the water of river Khan and its toxicity, the administration responded saying that the information was sent to them a couple of times, but they continued to use the toxic water of the river. According to the administration, the government had provided them with Narmada-Kshipra Pipeline, borewells, and pumps which should have sufficed for the water requirements of the locals. Such insights foreground a strong conflict brewing between the administration and the locals. The locals have the opinion that they always used the river to do farming and moreover since there is less water provided to them by the government, they are forced to use the dirty water of river Khan. On the hard hand, the administration maintains that using the water of the *nallah* to grow crops will affect the health of the people and cannot be permitted. The question of utilization of water in the river which has turned toxic is apolitical, and there is difficulty in taking any stand on this conflict".

Schnaiberg's (1993; p.203) idea of social inequality: The facilities near the river like primary school in Chavani has a wall shielding the school from the river. The kids in this school come from Shankarbagh, Narsingh Tekri and Sneh Nagar Jhopar Patti. The building of the school was poorly maintained. It was observed that street dogs and pigs were roaming around the school premises. At a distance from this primary school, there was a private school which was well maintained and was at a safe distance from the river. The two opposite observations show the effects of social inequality. The excerpt from the fieldwork expresses the same observation:

Photograph 14: Primary School in Chavani

"Photograph 14 shows the primary government school in Chavani. This school is 50 years old, having two teachers, Smt. Manju Chowdhary and Smt. Keshar Sharma who has been teaching in this school since 2008. Both Chowdhary and Sharma clarified that even though the school has a wall shielding it from the river, this does not minimize the putrid smell emanating from the river and entering the school premise. During the rains, even snakes come inside the school building, and in the daytime, the mosquitoes make it difficult to teach. The school has almost 63 students, from standard 1 to 5. Since it was constructed for the communities who cannot afford to teach their kids in private institutes, the students come from Shankarbagh, Narsing Tekri, Sneh Nagar Jhopar Patti and many other slum colonies. They informed that during heavy rains the school remains closed as the water gets inside the school building. Just adjacent to this primary school a glimpse of a well maintained private school at a safe distance from the river in the middle of posh colonies could be seen. Both the government school and the private school and their respective locations explained the idea of deferential rent much clearly which is giving rise to segregation of ones who can afford better living conditions and the ones who cannot. The scenario here explains that modernization has not only affected the natural resources but also the lives of the people causing social inequality (Schnaiberg,1993; p.203) and dividing them into starkly distinct groups.

Effect of heavy rains on Indore city: For four months June, July, August and September heavy rains tend to affect Indore city. The water in the river expands and retains its space engulfing most communities that live on its banks. In Khatik colony, a woman suffered a casualty as her husband died drowning in heavy rains. Similar kind of casualty was informed in North-toda. Communities mostly have to leave the river banks during rains for four months.

Negligence of environmental and ecological concerns: The field visit and interviews from the communities living near the Khan drain can be understood by the idea of Park (1936) who explains the 'web of life' based on the principle of 'struggle for existence' in which the survivors find their 'niches' in the physical environment and the division of labor among varied species. Urban development and industrialization have intensified the struggle for existence in the city of Indore. This can be observed with the help of this study as communities living near the river are ready to risk their lives for survival. The research clearly shows that while technological progress might have helped the elites, it has also grievously affected the poor population and the river body. The conflict with the administration, the degrading lifestyle of the commoners near rivers, the sheer lack of resources for sustained livelihood, the destruction caused during rains and the negligence of managing sewage and garbage discharge into the river bluntly point towards the fact that there is utter negligence of environmental and ecological concerns in the development practices of Indore.

As the interviews confirm, construction of pipelines to transport sewage generated from industries, domestic areas, shopping complexes and training institutes to the outskirts of the city into a sewage treatment plant (where sewage could be treated and then allowed to flow into the river) was the initial plan. But somehow, this plan could not be worked out due to the cost-effectiveness or negligence on the part of the administration. In Indore, there is only one sewage treatment plant placed at Kabit Khedi which can treat 90 MLD of sewage but is almost non-operative. According to the interviews

conducted around Kabit Khedi, one gets the suggestion that this sewage treatment plant has gone awry and requires urgent reconstruction and maintenance. Currently, it is not even able to treat 90 MLD of sewage. The people around this sewage treatment plant say that nobody has even bothered to care for its maintenance. Every day, the city is expanding, and the sewage produced is also increased manifold which has reached around 270 MLD on this date in Indore (c.f. Dhar, 2017). The rapid expansion of the city along with increased waste disposal and the degradation of river Khan explains that the three general functions that the environment serves for human beings, namely: supply depot, living space and waste repository (Dunlap, 1993) have been misused in this area. As the city commercialized the function of the supply depot, the initial aim was to use the renewable and non-renewable resources equitably for the growth of the city. But, the exploitation of the Khan river led to water scarcity in Indore region and the river turning into a garbage and sewage dumping site affecting the entire food chain with its toxic water. Optimum use of the city's living spaces or habitats could have provided for intelligent housing, hassle-free transportation facilities and other essentials of daily living; but an unthinking overuse of such habitats has led to congestion and dismal overcrowding of the communities living in the vulnerable zones near the Khan. With the waste repository function, the environment now symbolically serves as a 'sink' for garbage (rubbish), sewage, industrial pollution and other byproducts. It is thus ostensible that the ability of urban ecosystem has exceeded in this region to absorb waste which has resulted in health problems from toxic wastes and ecosystem disruption.

Metabolic Rift: This portion of the analysis discussed above highlights "metabolic rift" between humans and nature in the case of deterioration of the Khan river. It has been explained through the interpretation of Marx's idea of metabolism[41] (*Stoffwechsel*) (Foster, 2002). Marx through an understanding of

[41] Marx understood the concept of metabolism as one that constitutes the complex, interdependent process linking human society and nature. This concept enters into Marx's vision of a future society of associated producers: "Freedom, in this sphere [the realm of

social and ecological metabolism wanted to capture the inclination of human beings in fulfilling their material needs in the capitalist society than paying attention to their natural conditions of existence which according to him was a metabolic rift.

Capitalist production, Marx wrote (1971b), "turns towards the land only after its influence has exhausted it and after it has devastated its natural qualities." This statement of his relates not only to soil depletion but also to the antagonism between town and country. Marx considering the idea of Liebig and expressed that the failure to recycle nutrients to the soil had its association with irrational modern sewage system and the increasing pollution of the cities. His observation in *Capital (volume 3)* proved his stand that he was against the pollution caused in the River Thames due to excrement produced by the city of London. For Marx, the "excrement produced by man's natural metabolism," along with the waste of industrial production and consumption, was necessary to be recycled back into the production, as part of a complete metabolic cycle (Marx, 1981).

Marx emphasizes the concept of ecological sustainability through the need to maintain the earth for "successive generations", he captured the essence of the contemporary notion of sustainable development, defined by the Brundtland Commission as "development which meets the present without compromising the ability of future generations to meet their needs" (WCED, 1987). For Marx, the "conscious and rational treatment of the land as permanent communal property" is "the inalienable condition for the existence and reproduction of the chain of human generations" (Marx, 1981). Indeed, in a remarkable, and deservedly famous, the passage in *Capital* (vol.3), Marx wrote, "From the standpoint of a higher socio-economic formation, the private property of a

natural necessity]," he wrote in Capital (volume 3), "can consist only in this, that socialized man, the associated producers, govern the human metabolism with nature in a rational way, bringing it under their own collective control rather than being dominated by it as a blind power; accomplishing it with the least expenditure of energy and in conditions most worthy and appropriate for their human nature" (Marx, 1981)

particular individual in the earth will appear just as absurd as the private property of one man in other men. Even an entire society, a nation, or all simultaneously existing societies taken together, are not owners of the earth, they are simply its possessors, its beneficiaries, and have to bequeath it in an improved state to succeeding generations as *boni patres familias* [good heads of the households]" (Marx, 1981).

Critics think that Marx at a certain point believed in "prometheanism" ,yet whatever Marx may have thought in his more "utopian" conceptions, it is clear from his discussions of both capitalism and the transition to socialism that he did not believe in, what Nove (1987) claims, " that the problem of production had already been solved under capitalism or that natural resources were "inexhaustible". Rather, capitalism, as he emphasized, again and again, was beset with a chronic problem of production in agriculture, which ultimately had to do with an unsustainable form of production about natural conditions (Foster 1999).

Within industry too, Marx was concerned about the enormous waste generated and emphasized the "reduction" and "re-use" of waste- particularly in a section of Capital (Volume 3), entitled, "utilization of the refuse of production" (Marx 1981). Moreover, he gave every indication that these problems would continue to beset any society attempting to construct socialism (or communism). Hence, although some critics, such as McLaughlin (1990), assert that Marx envisioned "a general material abundance as the substratum of communism," and therefore saw "no basis for recognizing any interest in the liberation of nature from human domination, "overwhelming evidence to the contrary suggests that Marx was deeply concerned with the issues of ecological limits and sustainability.

Marx did not invent the idea that the earth was a "gift" of nature to capital. This notion was advanced as a key proposition by Malthus and Ricardo in their economic work. Marx was aware of the social-ecological contradictions embedded in such views, and in his economic manuscript of 1861-63 he

attacked Malthus repeatedly for falling back on the "physiocratic" notion that the environment was "a gift of nature to man," while ignoring how this was connected to the definite set of social relations brought into being by capital (Marx et al., 1975a).

Marx agreed with liberal economics that under the law of value of capitalism nature was accorded no value. He said that "the human metabolism with nature" was a highly dynamic relationship, reflecting changes in the ways human beings mediated between nature and society through production (Marx, 1981). For Engels too, it was clear that to construct a society built on the vain hope of the total conquest of external nature was sheer folly. As he wrote in *The Dialectics of Nature* (1940), one must not flatter overmuch on account of the human conquest of nature. Each such conquest fires back now and then causing a natural calamity. At every step, nature reminds that humans can never rule over nature like a conqueror over foreign people. He says humans with flesh, blood, and brains belong to nature and exist in its midst, and that all the mastery consists of the fact that former has the advantage of all other beings able to know and correctly apply its laws.

Marx translated his early theory of the alienation of labour into more material terms through his later analysis of exploitation and the degradation of work, so he translated his early notion of the alienation of nature (part of the Feuerbachian[42] naturalism that pervaded his Economic and Philosophical Manuscripts) into more material terms through his later concept of metabolic rift. Marx provides cautious constructionism, fully in tune with his practical materialism, which always emphasized the role of human practice, while remaining sensitive to natural conditions, evolutionary change, and the metabolic interaction of humanity and the earth.

[42] Feuerbach argues that nature contains within itself the principle of its own development. It exercises "unlimited creative power" by ceaselessly dividing and distinguishing its individual parts from one another. But the immeasurable multiplicity of systems within systems that results from this activity constitutes a single organic totality. (Harvey, 2011)

Some environmental theorists like Joan Martinez-Alier, Ted Benton, André Gorz, and James O'Connor faulted Marx to hold ecological blinders. They felt that his writings were anthropocentric and un-ecological. But in German Ideology Marx assailed Bruno Bauer for referring to 'the antithesis in nature and history as though they were two separate things.' In addition to that, Marx argued the celebrated "unity of man," has always existed in industry… and so has the "struggle" of a man with nature'. A materialist approach will deny neither reality, neither unity nor struggle in the human relation to nature. Instead, it will concentrate on 'the sensuous world', as Marx said, 'as consisting of the total living sensuous activity of those living in it. (Marx, et. al, 1975) From this standpoint, human beings make their own environments, but not under conditions entirely of their choosing, but rather based on conditions handed down from the earth and from earlier generations in the course of history, both natural and human (Foster, 2002).

Marx's main contribution in this area was methodological. He saw "the economic formation of society" as part of a process of "natural history" and struggled within his critique of political economy to take account of both natural conditions and the human transformation of nature (Marx, 1976). In the process, he applied a dialectical mode of analysis not to external nature itself (recognizing that the dialectic had no meaning aside from the self-mediating role of human beings as the agents of history) but rather to the interaction between nature and humanity, emphasizing the alienation of nature in existing forms of reproduction and the contradictory, non-sustainable character of the metabolic rift between nature and society that capitalism, in particular, had generated. Moreover, Marx conceived this metabolic rift not simply in abstract terms but regarding the concrete crisis represented by the degradation of the soil and by the problem of human and animal "wastes" that engulfed the cities. Both were equal indications, in his analysis, of the metabolic rift between humanity and the soil, reflected in the antagonism of town and country.

As German Greens have said, the system will recognize that money cannot be eaten only when the last tree has been cut- and not before. With this Foster (2002) is trying to convey using Marx metabolic rift that, one must not underestimate the capitalism's capacity to accumulate in the midst of the most blatant ecological destruction, to profit from environmental degradation (for example through waste management industry), and to continue to destroy the earth to the point of no return- both for human society and for most of the world's living species. It can also be said that the dangers of deepening ecological problems are all the more serious because the system does not have an internal (or external) regulatory mechanism that causes it to reorganize. The idea propagates that, there is no ecological counterpart to the business cycle (Foster, 2002).

By using the theory of metabolic rift, this study develops an understanding of how capitalism has caused disequilibrium between nature and society, by understanding the interaction between the Khan (nature) and Indore (city). As urban expansion took place, Indore became a center of industries, hospitals, education, and training institutes. The people who were entirely dependent for their livelihood on the natural resources such as rivers started working as labors in industries. Hence the river slipped from consciousness largely because jobs in the neighborhood no longer relied on the river for employment. Instead, Indore grew as a commercial hub; residents desired jobs in city government and did not appear interested in saving river-related jobs, this employment shift pulled more attention away from the river. The river and people's perception of it suffered during this period.

The city ignored the river and treated it as a sewer. Even after National Green Tribunal's guidelines to Indore Development Authority and sanctioned amounts of cleaning the river, it remains an open drain. According to the interviews and insights discussed in previous sections, the Khan does not have any flow in non-monsoon season and carry only highly polluted effluent of 'E' water quality grading. The maximum dry weather flow is 51.2 MLD. This river

and its tributary the Sarasvati are unsuitable for domestic water supply from both quality and quantity of flow.

The existing sewage treatment facility in Indore city is 90 MLD. Facility of treatment of 245 MLD is still under construction which brings it to 335 MLD to satisfy the projected population of 30.0 lakh up to the year 2020. Almost 110 MLD of waste from domestic discharge and 70 MLD discharged from industries flow into the river. River Khan once an urban heritage of Indore turned into a channel which carries sewage and drainage, becomes a solid waste and construction waste dumping site, encroached upon by low-lying slums causing, contamination of groundwater. As most of the sewage produced by the city flows in the river and is not treated, it flows to peri-urban areas where farmers have their fields just beside the river, utilizing the water for irrigation purposes.

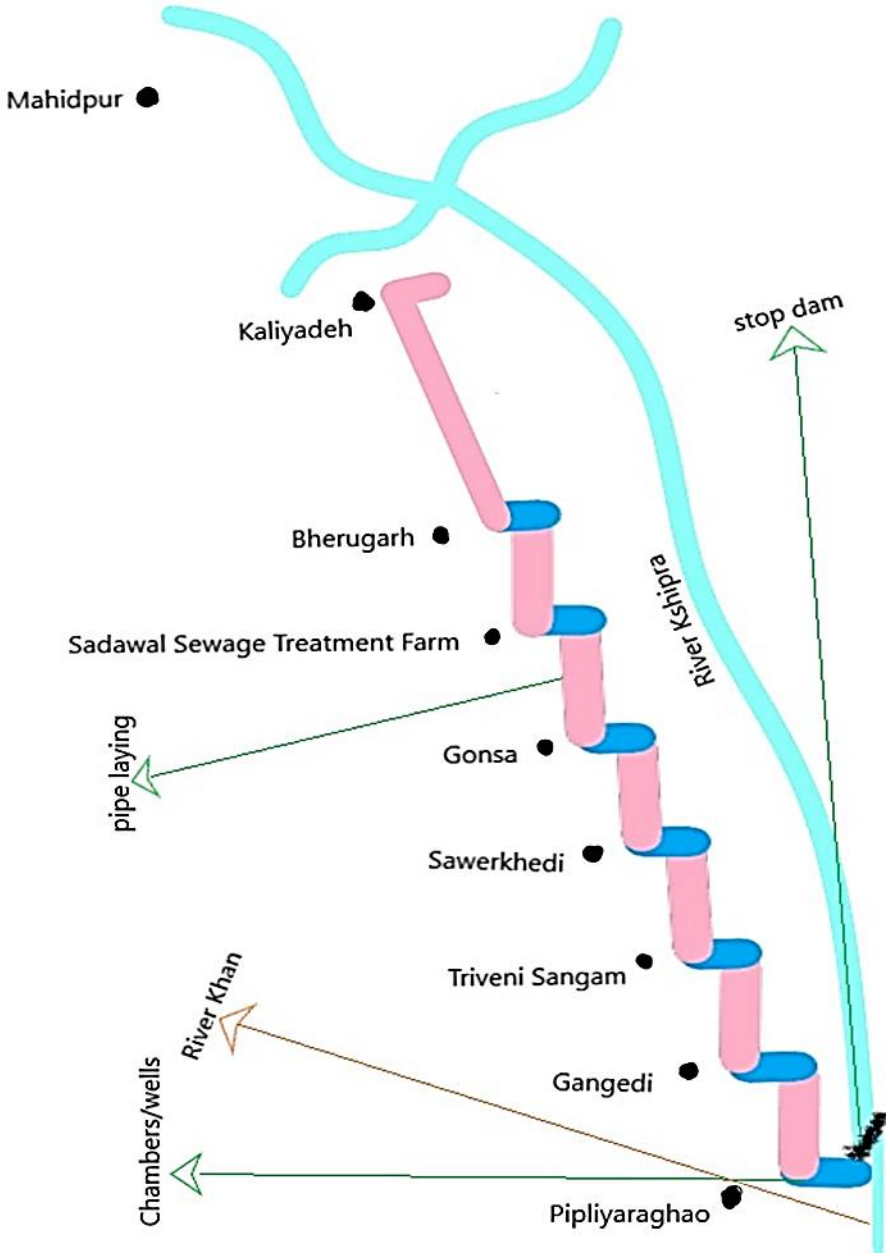
Farmers and the residents who have been staying for the past 45-50 years beside the river recognize the fact that this "subaltern" river has changed in its length and breadth and its water quality. But they believe that if there were no river, the government would arrange an alternative for them. The study reveals that human and non-human interactions produce socio-ecological conditions that are inimical to the continuation of human and other life forms, and the urban environmental catastrophe is not one to come, it is already here. If humanity is to succeed in pulling the world back from the brink of catastrophe brought on by capitalism's unrelenting creative destructiveness, the revolutionary reconstitution of society must be truly universal in its scope and its aspirations.

This section explicates that the residents of the stretch that have been studied living close to the Khan and its tributary the Sarasvati are engaged in menial work[43] and are extremely poor. The areas covered in this section prove that the littoral residents living on the banks of the river are also "subaltern" in all

[43] Daily wage labourers, ragpickers, house maids and beggars.

senses of the term, which induced the idea of conceptualizing their living spaces on the river as “subaltern.” Walking this stretch which is on the banks of “subaltern” Khan showed that deterioration of such rivers is the result of merely technical interventions that have overlooked the effects on the socio-natural composition of the river. The analysis confirms that the residents have become alienated from the river which was once the important location for the socio-cultural activities.

5.2 Khan- from pollution to diversion



Map 8: Khan Diversion Project

The unsuccessful attempts of the local bodies to manage sewage and garbage flow in river Khan became a crucial concern before Kumbh Mela could take place on the banks of Kshipra in Ujjain in 2016. To

solve this problem, it was decided by the local administration that river Khan will be diverted through a pipeline so that its water does not contaminate river Kshipra where people were expected to take a bath. This section elaborates why Khan Diversion Project was symptomatic of river management and development went wrong.

For the organization of the Kumbh Mel*a* festival, religious leaders were to be satisfied through arrangements made by the government to provide bathing facilities. These leaders who come from the city of temples examined several spots where sewage gets mixed in the holy river Kshipra. This comes from River Khan flowing in Dewas and Indore districts of Madhya Pradesh. They blamed the government for not cleaning Kshipra by filtration plant or diverting the sewage coming from its tributary river Khan. They also mentioned that Narmada-Kshipra Simhastha Link Project (NKSLP) which was created to provide a constant supply of water to river Kshipra during Kumbh Mela would not be successful if diversion of dirty water of Khan does not take place. Through NKSLP, water was lifted from Omkareshwar dam using pipelines and canals and was brought to the origin point of Kshipra at Ujjeni for almost 115kms. Through this dam, 5000 liters of water were flown from Narmada River into Kshipra River every second to make it perennial for *Simhasta* 2016.

Religious leaders from *Dharmacharya Parishad Kalyan Samiti (DPKS)* appreciated the ambitious NKSLP project of the government of Madhya Pradesh, but *Parishad* was unhappy with the improper implementation of the project. Dr. Avadesh Das, the State General Secretary of the *DPKS,* led the Kshipra purification drive. He suggested the government to prepare the project for diversion of river Khan and establish filtration plant to prevent the Kshipra from getting polluted. The delegation of religious leaders consisted of *Mahant*[44] Bhagwandas

[44] Chief priest of the temple

Maharaj, Digvijay Singh Maharaj, Mahant Peer Baba, Mahant Rajendra Das, Narayan Swami and Jayramdas (FP,2014).

In response to this suggestion made by the religious leaders, Khan River Cleaning Project (KRCP) was decided to be linked with Ganga Action Plan (GAP) which was declared by Mr. Sanjay Dubey, the acting commissioner of Indore. Very less time was remaining in *Simhasta* 2016, so the focus of religious leaders, newspapers, and administration shifted towards the Khan river. A new sewerage treatment plant(STP) was to be constructed by October 2015, and it was supposed to recycle from December 2015 as per the statement of Mr. Dubey. In addition to this statement Ms. Malini Gaur, the Mayor of Indore added that this STP would be complete before *Simhasta* and the sewage flowing in river Khan will be diverted towards it (ToI, 2015).

A judicial member of the National Green Tribunal, Mr. Dalip Singh, inspected the ongoing work to clean Khan and Sarasvati River. He instructed the district collector to finish the work before the start of *Simhasta* Festival around April 2016. To follow the instructions given by Mr. Dalip Singh, Mr. P Narahari the district collector of Indore stated to a newspaper that a sewerage treatment plant with a capacity of 245 MLD would be ready before *Simhasta* fair (HT, 2015). But instead of installing a sewerage treatment plant, after a few days, state government awarded Rs 100 crore contract for the diversion of Khan river at the outskirts of Ujjain. Mr. Dalip Singh questioned this move of the administration by asking, “if a sewage treatment plant was being constructed, then what was the need to divert the river course?” (HT, 2015). This section of the thesis examines the Khan diversion project in the rural areas of Ujjain district.

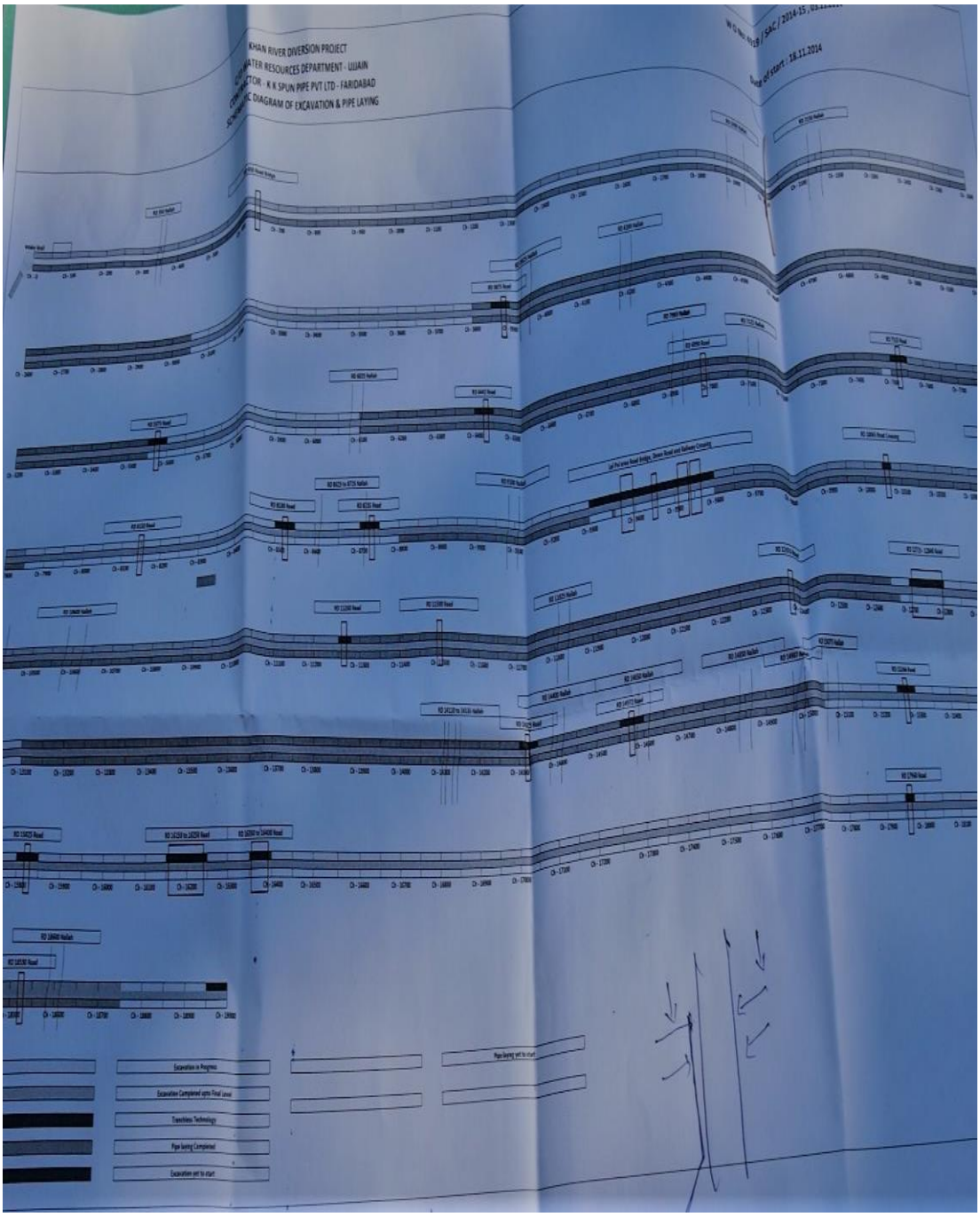
The contract which was of Rs 100 crore for the diversion of Khan river included the stretch of 19.25 km which starts from Pipliyaraghao and ends at Kaliyadeh. The survey conducted by the government suggests

that almost 13 villages of Ujjain and Ghattia Tehsils were to be included in the diversion project. This project was the process to keep the Kshipra free from pollution caused by its tributary the Khan. The diversion project was supposed to start from January 2015. The survey work for diversion of the Khan river was performed in seven villages of Ujjain which were: Pipliyaraghao, Gangedi, Gothada, Mojamkhedi, Kalukhedi, Bhadedchak and Aahikhana. The survey which took place to know the exact path in which the pipeline would be laid includes, twenty meters of land to be acquired from the villages of Ujjain tehsil and 30 meters in villages of Ghattia Tehsil. Occupying the lands of the farmers for this project required excavation of their lands, which would affect the total production of crops that grow in their fields. To deal with this damage administration decided to give the farmers some money for two crops in a year as compensation for the time the project construction goes on. Officials were appointed to spread awareness about this project to the rural people and convince them to give their lands for diversion of River Khan before *Simhasta* fair (FP, 2015).

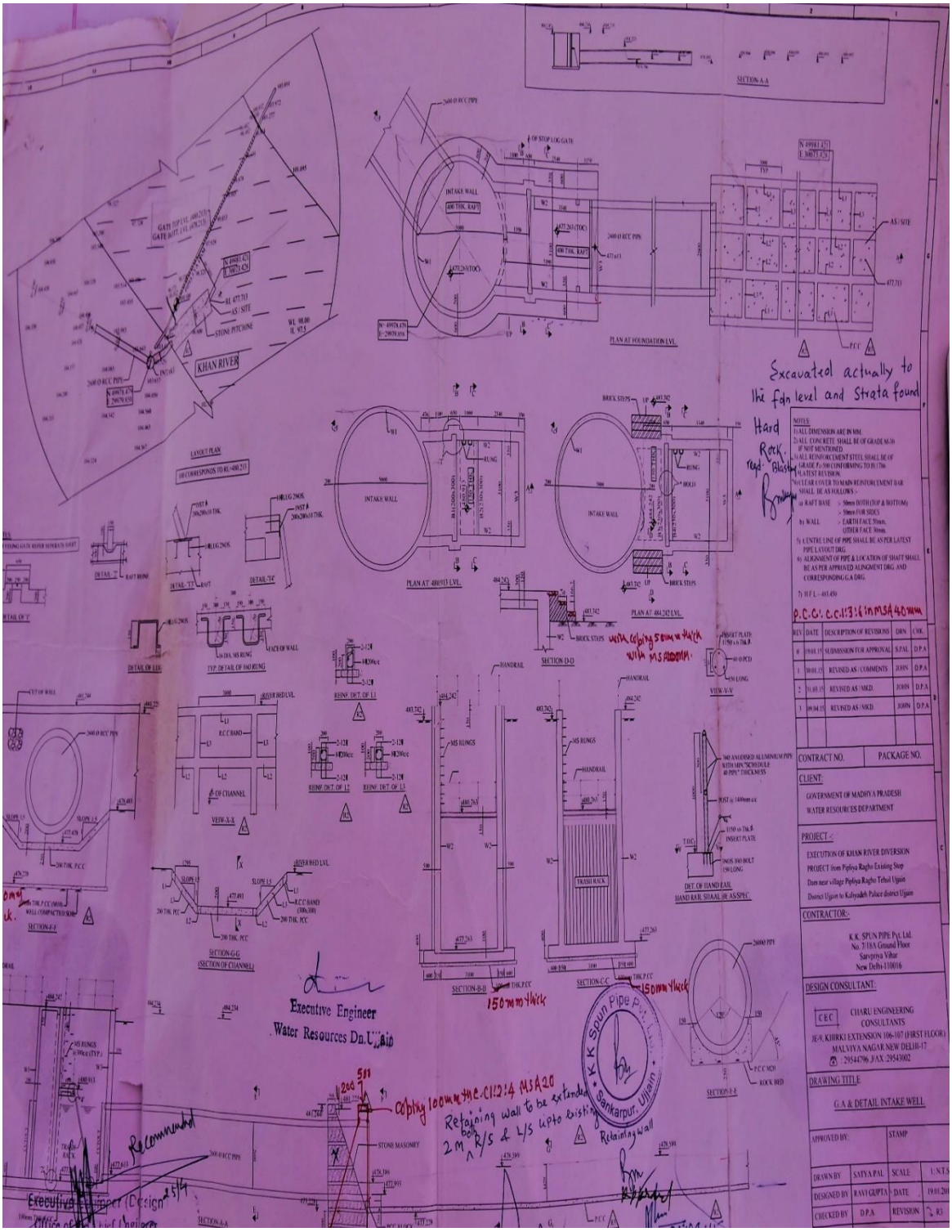
Project Details:

The company K.K. spun got this tender for Rs.75 crore. The pipelines were to be laid to divert the Khan for 19.25 km. The government accepted tender in October 2014, and according to project staff, it was released on 18th November 2015. The project had an estimate of providing 13 irrigation wells for diversion. The dimension of the pipes was 2.5 meters length with 2600 mm inner diameter and 3100 mm of the outer diameter. The weight of the single pipe was 16 tonnes, and therefore it required 90 to 100 tonnes weight crane to lift the pipe. The water diverted from the zero point will flow through the slope created with the help of pipe and will fall into the well which is further connected to another section of the pipeline and so on. The photograph 15 provides the diagram of a pipe-laying process, and photograph 16

provides the details of the pipe-laying and construction of wells, and Figure 9 is a sketch diagram to show how water will flow through this diversion project.



Photograph 15: Pipelaying diagram for diversion project



Photograph 16: diagram explaining process of pipe-laying

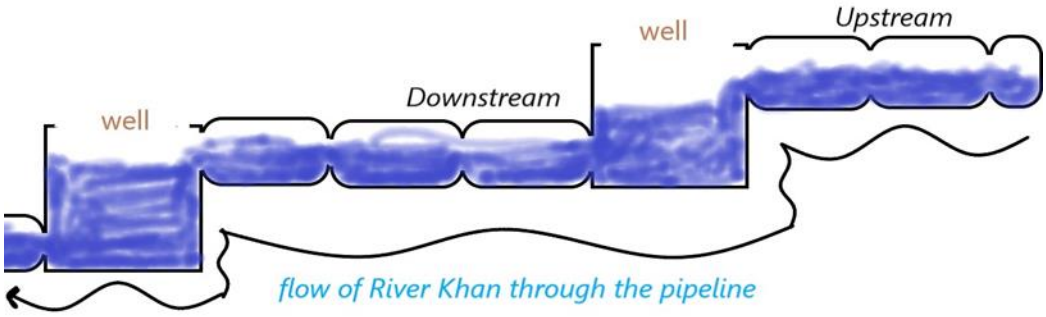


Figure 9: Sketch diagram of the water flow through the pipeline and well

The fieldwork details of this project provide the following insights to this study:

Unsuccessful attempt of administration to manage waste:

This project was undertaken because the administration could not manage the waste generated from the industries, domestic areas, shopping malls and training centers which flowed into the Khan from the city of Indore. It resulted in the construction of the diversion project through laying of pipelines. As the company and administration explained the farmers about the project, they resisted but with the help of Gram Panchayat of Pipliyaraghao the administration could manage to borrow lands from the farmers and construct this project. To save money, the company K.K. Spun laid the pipelines directly on the excavated land which were either made of mud or stones rather than using PCC[45]. PCC was mentioned with a red pen later in the map of Khan diversion project as shown in photograph 16.

The land where pipeline project took place was of two kinds stone and pure mud. Laying of pipelines on the areas which were made of stones

[45] Plain Cement Concrete (PCC) are mandatorily placed on ground/soil strata, to give a firm, clean base for laying the pipelines.

are still plausible but laying pipelines on direct mud will decrease the chances of success of the diversion project. Pipe laying on the mud will cause percolation of water to the soil beneath the pipe which will in return create disturbance in the structure in which the pipes have already been laid. It will also affect the velocity of water flow inside the pipe. During the process of pipe laying, there were gaps found between two pipes if these small gaps are not filled with concrete it can cause more exploitation of water. Hence it can be said that such projects are an example of creating a temporary technical solution for a social problem like the deterioration of the minor rivers in India. Hence in the words of Scott (1998, p.4), it can be said that "it was a well-intended scheme to pretend to improve the human conditions." It was so because the maps provided to the contractors did not successfully represent the actual status of the grand reality, but only a slice of it.

Photograph 17: sections where pipes were already laid

Photograph 18: Pipes laid had gaps in between

The fieldwork data suggests that the administration decides the budget for a project and emphasizes on technology and implements it using the lands of farmers which is easily accessible. When farmers sit on a strike, administration convinces them that the project is good for their village, with continuous convincing about the idea of development, people believe them, and after a while they allow the government to divert the river through their fields in a pipeline. Without realizing the fact that it will negatively affect their lands in the long run. Laying the pipelines through the lands of the farmers helped the administration get cheap labor. The farmers could also be convinced for the compensation of two crops in a year by the administration, but the land borrowed from them required almost five years to regain its fertility. Resulting in farmers suffering from financial losses for five years. Therefore, this project is an exemplification of the dominant system which develops at the expense of lives and livelihoods of the poor. The excerpt from the fieldwork suggests the same: “Mr. Chandan the supervisor of the zero point of Diversion project informed this study that almost 20 villages were covered to divert river Khan to the downstream of Kshipra. He expressed the advantages of the project and said, it will carry dirty

water directly to the downstream of river Kshipra. People would be free from sewage-related diseases. River Kshipra which is receiving the backwater of Narmada River would remain clean. This project will also provide livelihood to people living in the villages of Ujjain and Ghatia tehsil in the form of guards, office boy and labors. He also stated that the company created three different teams to finish the work. The first team was for supervision, it kept this task for itself, the second team was working under JBL and other local companies to perform machine work, and the third team was for pipe laying. The third team had diverse functions such as connecting the belt of the crane to the pipe, attaching rubber to pipes and laying the pipes which were lifted or dropped by the crane. The project was divided into ten different sections at ten separate places and has ten distinct contractors for pipe laying. Pipe laying team used to get its labor from the nearby villages.

When inquired about the challenges that the project faced Mr. Chandan said that farmers could not grow crops for the time the pipelines were laid, but the company had provided compensation to the farmers for two crops. He informed the study about disputes that took place amongst the company and the farmers related to the compensation provided to them. Another challenge that he talked about was the company surpassed the limits of the stretch to lay pipelines that cause utilization of more lands of farmers. When asked about the feasibility of pipeline of 2600mm diameter pipes containing the river water, he said, “the Khan doesn’t have much water during summers and winters, for these seasons its water can be contained in a pipeline. But during the rainy season, the zero point at Pipliyaraghao will remain closed, as then Khan swells up and its water cannot be contained in a pipeline so that it will pass through stop dam”. By standing near the zero point, one could see lots of land used for excavation and for keeping the raw material for this project. This shows the aspiration of administration of ordering nature and society according to their convenience (Scott,

1998,p.4-5). It expresses that with the help of technology, the administration thinks it can keep a river concise to a pipeline for the time it wants, and it can release it whenever it feels it's necessary.

Inquiring a group of farmers at Pipliyaraghao about the project one of them stated that his land was taken by the company for the last eight months and its work has been very slow which had affected his occupation. He mentioned when his land of 1 acre was taken he was given Rs 40,000 as compensation but recently he only received Rs. 6000 for the same land which is not what was promised before when they gave their land to the company. He also expresses that the company had not leveled his land which was the assurance given to them when the work started. In between his response, two to three other farmers made statements like "the company needs time to finish its work, once they will finish, they will come back and level the lands."

Except for one or two of them sitting in the group rest were sure that diverting the Khan was very necessary. They informed that the water was filled with sludge and chemical waste which was harmful to the crops. They also mentioned that sewage water could not be used for religious activities. They say that providing their lands to the company was their contribution to make Kumbh Mela successful. The work of laying pipelines was to be finished by March 2016 but all of them sitting in the group doubted the deadline.

When asked about the inconvenience they faced during construction of the project, they said that as the transportation of the pipes and heavy vehicles took place, it created cracks in roads of the village. They were not sure whether the company would do the reconstruction or gram panchayat will have to do it. They also mentioned that Panchayat and the Company had many clashes related to general issues of roads, water, and acquisition of extra land, but the company agreed to give the compensation of the extra damage which was caused to the village.

After a while, one more farmer came and joined the group. He stated that the compensation he got from the company for his 1.2 acres of land.for the first time was Rs. 50,000 but later he was given only Rs. 7000 the second time which he mentioned was his monetary loss as his whole family was dependent on farming".

The administration lures the farmers through technology, offering them convenience in the form of water available for irrigation purposes. For instance, the farmers were told that intake wells were being constructed at every 2 kilometers of the stretch of laying a pipeline to withdraw water for irrigation purposes, but according to the interviews at different sites, these intake wells had a different purpose to serve. One supervisor at the zero point informs us that these intake wells would provide the farmer's water for irrigation while another supervisor at Bherugarh explains that they are providing chambers at a distance of one and a half kilometer. He mentions that these chambers are being created to let toxic air pass which is generated through the toxic water that flows in the river Khan. It is also created to manage the sludge or waste if it gets accumulated inside the pipe. Most of the interviews that were taken from the farmers, they were not aware of the information that these intake wells were chambers to let the toxic air pass or manage the sludge flowing in river Khan. Farmers were also not aware that the project would require deep excavation and they will have to be careful from these construction sites. The farmers who worked as labors or send their families to work on these sites were not prepared for the tragedies that took place during construction of this project. This can be understood with the help of excerpts from the fieldwork: "In Saverkhedi a group of farmers stated that they got to know about the diversion project when there was a huge fight between villagers and the administration at the zero point for not allowing the project to continue. There was another dispute that occurred between farmers and company while laying pipelines the workers had broken the pipes to irrigate

fields of some farmers of Pipliyaraghao; villagers had beaten the workers of the company; a police case was also filed. These farmers further informed that when the project started the company said the very small land would be used but later they took even those farmers lands which were not listed in the diversion project. They said the opposition towards this project was raised only once and that was in the beginning, later the villagers had to agree to this diversion project.

They also informed that the compensation provided to them was very less. They mentioned that the places where the Kshipra is not close to the land had the facility of wells to fulfill water requirement which is covered with soil and other materials used for the construction of diversion project. The farmers said that there is no deadline to finish the project. Farmers mentioned that it was just a fake show that dirty water is being diverted, they feel that the company used sand dust as a base to keep these pipes which is a temporary form of construction. They would not be able to continue farming in their lands and in case they use tractors on these lands during rains then the entire land might crumple down.

They were given compensation for one crop varying from Rs 5000 to Rs 6000 for their lands, but more land was used by the company, and they did not receive compensation for the extra land. They said instead of this project; the government should have used some other techniques in the city to clean the water of the Khan. Cracking jokes, on the way local administration works, one of the farmers said: “the government has a lot of money to waste, so it has attempted to divert the Khan with the help of this project.” They were sure that this project would not last more than one year. When asked if they signed any paper, they stated that the company gave them a paper and said if they sign this paper then only they will get compensation for their lands. They signed it because they were sure that either way their lands would be taken by the

government. They made them sign the paper in which one of the farmers who could read told them it was written that the farmers would not have any objection if they utilize their extra lands to keep the extra soil and pipelines of the construction site, this information was not circulated to them verbally.

They informed us that officials from the company were appointed to take the signature of the farmers. Some say that administration bullied them and said if you don't sign the paper you would be arrested and will be left only after *Simhasta*. One farmer helplessly exclaimed that most of them in the villages could not read that is why the administration has taken advantage of their weakness. He said, "the government is using farmers money to create troubles for the farmers" and added that nine months have passed since the project started but recently when Kumbh Mela came near the pace of work has increased. Farmers expressed that they heard from company workers that three more months are required to finish the work. They said they don't think the diversion work will get over as it is just a process to fool people that the government is doing something about the dirty water.

Farmers of Saverkhedi stated that the administration inquired from every farmer "how much they produce for wheat in 0.40 acres (1 *beegha*) of land for a year if they said Rs.15000, they were paid half of it. Some farmers were not aware of how much they produce for a small piece of land if through assumptions they told the administration less money, they gave them half of the amount. A few people got the compensation money rest were trying but could not receive due to lack of various identity proofs requirement. The farmers also mentioned that company told them that they had constructed wells for the convenience of farmers at every 2 kms, but actual construction of wells at some places was at 3-4 kms distance. This, according to a respondent would create conflict between those who live close to the well and the ones

who live far away. One of the respondents informed that company was making wells to let the toxic air pass, as the water of the Khan is toxic, and once directed through a pipeline will produce toxic air and to let this air pass they were providing these wells, hence these wells were for the project not for the farmers.

The respondents were angry at the Sarpanch of Pipliyaraghao and expressed that Panchayats are supposed to protect the rights of farmers, but the Panchayat of Pipliyaraghao took the side of the administration. One farmer informed that the project would be closed after *Simhasta* as the purpose is only to fulfill the festival requirement. They said that these pipes do not have any pump to push the water out till Kaliyadeh. A worker who was part of Saverkhedi site added to the conversation of the farmers that this project is very risky given the example of causality that happened near Bhimandi in Ujjain, a kid fell into the excavated land nearby. He explained that the construction site workers tried to take that kid out, it took 17 hours to search the kid and take him out. This incident occurred at night; he added that at night these excavation sites become more dangerous. Another casualty occurred in the Gonsa village where the pipe-laying process was under progress. During the field visit to this area, this study found that a wall fell on a worker who was inside 14 to15m deep excavated site. His name was Rohit and he was14 years old. He was lured by the contractor of the site for a smartphone. The contractor told him that daily work would cost him Rs. 300 with which he would be able to buy a smartphone of Rs. 5000 for himself'.

These excerpts suggest that the administration used both the farmers and the rivers to fulfill the purpose of organizing Kumbh Mela.

Misuse of 73rd Amendment Act

This diversion project was also an example of the false use of the 73rd Amendment Act. The areas of Chayan, Pipliyaraghao, and Gangedi reveal that on papers the powers would have been decentralized, but it is not visible practically. The excerpts from the fieldwork suggest that "the lady Sarpanch's husband performed all the work and she stayed at home. Her utterance of small sentences and her surprising looks while discussing the project explained that Government legislation (73rd amendment act) forces the rural people to elect a woman as there Sarpanch, but she feels her husband is more capable of carrying out the roles and responsibilities the Constitution has empowered her. She does domestic work and stays at home while her husband performs all her duties. There are some examples of female Sarpanch's changing how Indian villages function (Das, 2018)[46] but even today there are many villages where simply raising the reservation for women and not showing any concern or efforts for their capacity building, training or inculcating confidence leads to such situations.

Allowing the state government to grab lands in villages and construct a diversion project of river Khan is an example of a decentralized yet non-decentralized system of Panchayati Raj in villages of Ujjain. Panchayati Raj Institution (PRI) was created to endow the Panchayats with such power and authority that may empower them to function as self-government. But in Pipliyaraghao PRI was unable to defend the grounds on which they were not in agreement with the government to carry forward the diversion project. As explained by Narendra Malviya, the Panchayat Sahayak Sachiv even when he knew like other project's this project will also not be successful. He and the Sarpanch had to

[46] Das, T. (2018). These female sarpanches are changing how Indian villages function. India Today. Available from: https://www.indiatoday.in/lifestyle/people/story/these-female-sarpanchs-are-changing-how-indian-villages-look-1222228-2018-04-28.

defend the Khan Diversion Project in front of the farmers of the villages. They had to convince them that their lands will be returned the way they were, even when they knew that is not possible. In discussion with him he expressed that people of the villages were not using water of Khan river which was false, as, in most of the interviews with farmers, they had informed that they used water of the Khan for irrigation purposes and it had a positive impact on their crops. This shows that Panchayat never expressed its dissatisfaction to the government that water of river the Khan should be treated before it reaches the villages of Ujjain. When the decentralization of power to local bodies in Pipliyaraghao is observed it is found that there is an overlap in the functions of development and panchayats functions leading to confusion, duplication of efforts and shifting of responsibility. For instance, if the District Magistrate (DM) had the responsibility to help the state government implement this project, the responsibility of Panchayat was to let the DM know how impossible it was to implement this project and how it would negatively affect the lands of the farmers. They should have insisted on the formation of a sewage treatment plant than diversion project. The Panchayat should have also insisted on using the urban lands for diversion than using rural lands because the urban areas were responsible for creating more waste. But the Panchayat just followed the orders that came from the state government and instead of helping the farmers helped the government construct this project.

Compromise on environment

The data collected for the understanding of the diversion project suggests that environment has been compromised at different levels in various districts of Madhya Pradesh by carrying the river Khan's water from Indore to Ujjain then to Madhipur and further. It suggests that the diversion project has cost less than establishing a new sewage treatment

plant on the outskirts of Indore. But this project has exploited the land and will further contaminate the other districts after diversion, as the filtration process used in this project can not remove the dissolved chemicals into the water. The way pipelines have been laid in the villages this project will further contaminate the groundwater as loss of water from the pipes will reach the ground and will affect its quality.

The concern of the farmers related to the leveling of the land is valid as land leveling causes severe soil disturbance that disrupts or alters the entire equilibrium among near-surface soil (Oxtekin, 2013)[47]. It leads to severe soil alteration and consequently disruptions to the soils physical, chemical and biological properties. It leads to a decrease in the soil's organic matter, silt percentage, pH, soil respiration, bacterial community, and microbial biomass carbon. Due to the utilization of inappropriate machinery and non-removal of surface soil and its re-diffusion, most of the desirable soil properties are reduced and are not revitalized even after four years (Sh, A. et al., 2014)[48].

This project demonstrates that government has initiated certain actions through which it is trying to show that its concern about the sewage and waste that the Khan carries with it from Indore city and pours into the Kshipra in Ujjain. It is an example of a "well-intended scheme to improve the human conditions went tragically awry" (Scott,1998; p.4). The observations presented in this project suggests that the administration decides the budget for a project and emphasizes on technology and implements it using the lands of farmers who are poor. When they sit on a strike, administration convinces them that the

[47] Oztekin,T. (2013). Short-term effects of land levelling on Irrigation-Related some soil properties in a clay loam soil. Scientific World Journal, v.2013. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3694488/

[48] Sh, A., Gorji, M., Asadi, H., Poubabaee, A.A.(2014). Land Levelling and Changes in soil properties in paddy fields of Guilan province, Iran. Paddy and Water Environment, 12 (1). https://www.researchgate.net/publication/257495347_Land_leveling_and_changes_in_soil_properties_in_paddy_fields_of_Guilan_province_Iran.

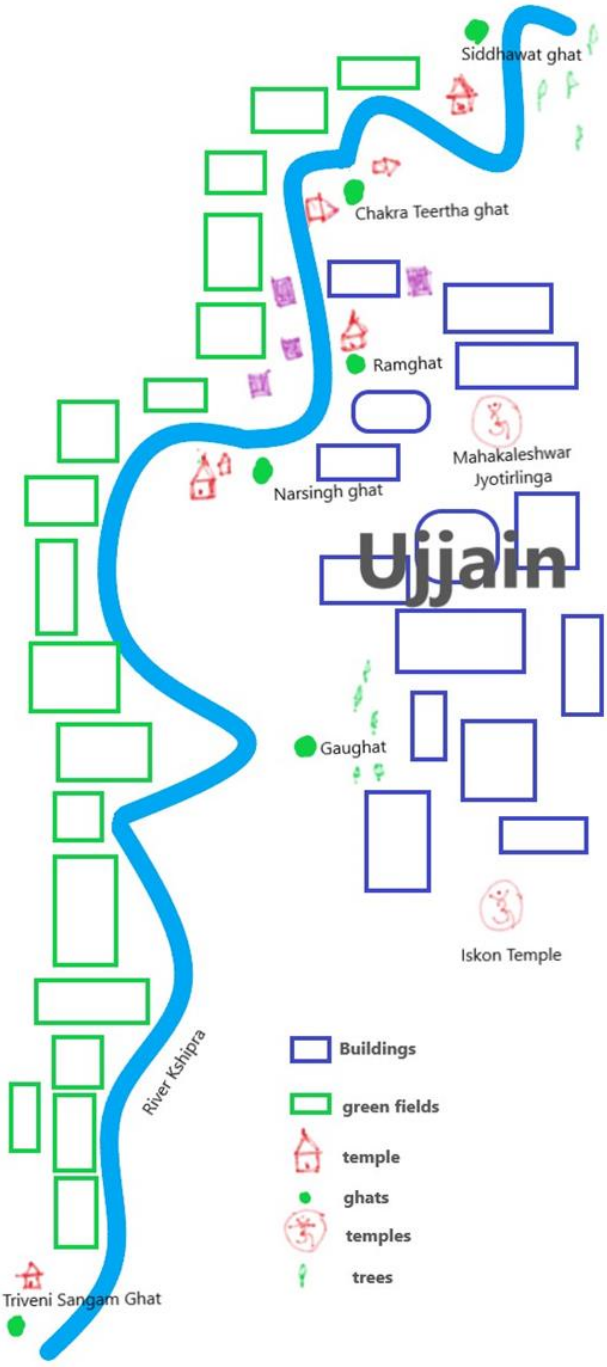
project is good for their lands, farmers believe after a while, and they allow the administration to make its project successful. Without knowing the fact that it is going to harm them and their lands in the long run. Laying the pipelines through the lands of the farmers helped the administration get cheap labor, and they gave them two crops compensation for a year which was less because their piece of land would not be the same for the next five years. The farmers were told that wells were being constructed at every 2 kilometers of the stretch, but they were chambers to let the toxic air pass and to manage the accumulation of waste in the pipeline.

Therefore, this project is an example of high modernism which means that once the sewage in River Khan was difficult for administration to handle in Indore city, they created a diversion project which is an example of certain form of planning and organising the waste in such a way that sewage remains away from the eyes of religious leaders, people and international organisations which will come to look at the way Kumbh Mela is organised in Ujjain. As these forms fit snugly into a high-modernist view. The project is an example of those who wanted to use state power to bring changes in people's work habits, living patterns, and worldview. What was found lacking in this project was the absence of civil society, which was also the reason of inconvenience caused to these villagers. This project is an example of a dominant system which develops at the expense of the lives and livelihoods of the poor.

Even after Kumbh Mela this project went on, the way it was implemented showed that minor rivers like the Khan are truly under - represented. It was visible through the following process for instance when Kumbh Mela was close, then the discussion about the amount of waste the Khan carries came into limelight. The administration kept on exceeding the timeline to clean the Khan; ultimately it had to be

diverted for 19.25 kms so that its water could not meet the water of Kshipra during the festival of Kumbh Mela. This shows that if the Kshipra is “subaltern” river of the Ganga, then the Khan is “subaltern” river of the Kshipra. The level of neglect towards the Khan shows that due to a decrease of the importance of this river at various levels, i.e., central, state, in the city and at the community level makes the river insignificant regarding its existence. And if its importance remains, it is mainly due to local vote banks or a carrier of the drain.

5.3 The changing contours of Kumbh Mela



Map 9: The schematic map of the prominent ghats in Ujjain city

This section discusses the changing contours of Kumbh Mela which intricates that technological interventions in India have an acute religious and socio-

political component. The construction of NKSLP and KDP are the examples which show that socio-political drives the technical. It can be understood in the following manner. On the one hand, NKSLP was used to transfer water *to* the Kshipra. This project was undertaken to maintain a continuous flow of water in river Kshipra. On the other hand, KDP was used to transfer water away *from* the river using pipelines. This project was undertaken to divert the dirty water away from the Kshipra River. Both these projects mirror the socio-religious linkages of the technical interventions in the governance of rivers in India, as they are commenced in the wake of *Simhasta Kumbh Mela* and its efficient performance.

5.3.1Kumbh Mela celebration on the banks of Kshipra

River Kshipra in the ancient times was regarded as the "Ganga of Malwa," but today it has become 'unholy impure Kshipra.' As around eighteen drains, including major and minor, pour filth into the river. The city of Ujjain uses the river as a sink for the distinct discharge of sewage. "Unfortunately, the Kshipra has its main feeders the Khan and Chandrabhaga[49] rivers which pass through Indore have lost their pristine nature and have turned into main sewers of the city of Indore. Whatever water Kshipra has consisted largely of the effluent flowing from Indore".

The practice of Kumbh Mela goes back to the eighteenth century; it is the largest congregation of people on the planet. This fair attracts the faithful in millions. The full name of this festival is *Poorna Kumbh Mela* (full pitcher fair). The fullness of the pot symbolizes the abundance of river water. This festival is essentially a water festival to thank the gods for "bountiful water." In India, 80 % of the annual rainfall depends on the moods of the four-month southwest monsoon; so, water worship is as ancient as the birth of civilization along the

[49] tributary of the Khan

rivers. Millions of people who come to take a bath in the river seem overtly conscious of the lack of flow in river Kshipra.

So, in the wake of *Simhast Kumbh Mela* and the presence of very little clean water in the Kshipra the government initiated some temporary measures such as diverting the polluted water of the Khan (discussed in previous section), banning the drawing of water from the littoral areas of river Kshipra, and some permanent measures such as laying a 47 km pipeline across the Vindhya ranges, scaling a height of 348 m to bring water from river Narmada to the point of origin of the Kshipra at the Mundla Dosdar and Sonway villages in Indore district. This project is known as Narmada Kshipra Simhastha Link Project (NKSLP). It was created to fulfill the water requirement of the one-month-long festival of Kumbh, 2016.

The photograph 19 below expresses the ancient story of Kumbh Mela which is discussed in the next paragraph.

Photograph 19: Churning of the ocean which became the reason of Kumbh Mela

Kumbh Mela is celebrated on the sub-tributary rivers of Ganga Basin, Kshipra is the southernmost tip of the Ganga basin. This festival is celebrated for the life that sprung for creation. The story behind this festival says that gods and demons were fighting over the pitcher *(Kumbh)* filled with nectar *(amrita)* created by the churning *(manthan)*

of the oceans. Indra's son Jayant ran away with the pitcher, and for twelve consecutive days demons kept on fighting gods for the pitcher. Ultimately the gods won, and they drank the nectar of immortality. During this battle for a pitcher, the nectar's (*amrita*) four drops fell at four separate places namely: Allahabad, Haridwar, Nasik, and Ujjain, which are the four cities where the festival of Kumbh Mela is celebrated even today (Shiva, 2002[50] in Singh and Mishra, 2017[51]).

Ujjain city is situated at the right banks of Kshipra. This section delivers the experience of Kumbh Mela on the banks of Kshipra in Ujjain in the year 2016. This section discusses the primary data collected from 1st January to 1st July 2016, to know the effects of Kumbh celebrations on the banks of the Kshipra in Ujjain. To describe the *Simhasta*, the study surveyed the Ramghat in Ujjain. It is the most important *ghat* amongst all the *ghats* on the banks of the Kshipra as it is close to Mahakaleshwar Jyotirlinga which is like the center of the city.

Photograph 20: The Kshipra near Ramghat, Ujjain

[50] (Shiva, 2002)
[51] (Singh and Mishra, 2017)

Seeing *Simhasta* through the eyes of Religious leaders

This section talks about the understanding of Kumbh Mela and river Kshipra from the religious leaders' point of view. In an interaction, with the priest sitting near the *ghat*, Maharaj Someshwar Giri, who was from Chamba (Himachal) and was staying near the *ghat* for the past two months in Shri Panch Guna Akhara. The study discussed with him about the changes in the status of the Kshipra and its effects on the Khan diversion project on the Kshipra.

He stated that Kshipra's water has been completely exhausted and has reached its capacity and so there is no water left in it of its own. But Kumbh Mela falls at an interval of every twelve years so, to fulfill the water requirement of a holy bath on the banks of Kshipra there was a necessity to bring backwater of Narmada from Omkareshwar. For this purpose, the government developed Narmada Kshipra Simhastha Link Project (NKSLP). He mentioned that the water would be released when Kshipra near all the *ghats* is cleaned properly. He pointed out towards the pokland machine which was throwing all the sludge out of the river. Some workers were also involved in removing the waste around Kshipra. He mentioned this cleaning process would increase the depth of the river.

He stated that once the river is clean the black water visible in the river will be drained out, and Narmada's backwater will be pumped to these *ghats* for taking a bath. He pointed towards the green motors which were visible at a distance to suck all the dirty water out towards Sadawal sewerage pond. He mentioned that religious leaders are sitting at every *ghat* to make sure that thorough cleaning takes place before the *Akharas*[52] take a bath during a month-long festival. He also stated

[52] It is a Sanskrit word denoting a place of practice with facilities for lodging, boarding and education for a particular sect or order.

that this cleanliness drive had focussed mostly on diverting all the *nallahs* and the Khan river to some other place, not into Kshipra river. He informed that "this initiative was taken by both administration and religious leaders as the administration had to set an example internationally for a month-long Hindu festival and religious leaders have to take a bath during the holy festival. On their demands, Kshipra would remain perennial for a month-long festival starting from 21nd of April 2016 to 22nd of May 2016".

In further inquiry from Maharaj Someshwar Giri spoke about the exploitation of water of Narmada, he began to talk about the importance of water. He stated that Lord *Brahma* who created the world considered water as an essential element for survival. When a child is born all the rituals are performed using the water near the banks of the river and when he is dead his body is flown into the river where fishes eat the dead flesh, or sometimes the body is burnt, and ashes are flown into the river. Apart from rituals the water is used for drinking, for cleaning and other purposes by humans, hence rivers are lifelines for all the species on the earth. He informed that there are 360 rivers in India including tributaries, sub-tributaries and most of them are unknown to people today because currently, the society is living in *Kali Yuga*[53].

[53] The Vedic reckoning explains that we are in *Kali Yuga*, an unspiritual age of ignorance, sin and short lifespan. The other three ages are Satya Yuga (Age of Wisdom and Truth), Treta Yuga (Silver Age), and the Dwapar Yuga (Copper Age). In 'Brahma-Vaivarta Purana' Lord Krishna says Kali Yuga will end in 5000 years after its beginning giving rise to Golden Age (Thakur, 2016).

Photograph 21: paintings of various religious leaders

Adding on to his argument he recited a verse *(shloka) "Kaliyuga keval naam adhara sumir sumir nar uttarahi paara,"* which means in *Kali Yuga* only by reciting the name of almighty a person can achieve solace. He relates this to the rivers and says if a dirty river flows through a pure river, however dirty the water maybe, it cannot affect the purity of rivers like Ganga and Narmada. He mentions in *Kali Yuga* all rivers and *nallahs* are to become one, this happens because people in *Kali Yuga* have a different understanding of the river some people consider it religious, some look at it as a scenic attraction, and some consider it as a source of exploitation. The importance of rivers in Hindu religion can be understood only if the humans perform rituals on the banks of the river. These rituals bring peace and harmony and make the human beings free from his sins. He adds rivers are so rich in their content that they can heal both humans and animals. He mentioned that "all 360 rivers for religious leaders are sacred as most of them drain into Narmada and Ganga but for humans, these rivers are only the source of exploitation. *Kail Yuga* has made their eyes blind so they cannot see the power of these rivers". This way he blames *Kali Yuga* for the exploitation of the rivers. He thinks it is the reason which has led to an increase in population, which has further led to the generation of waste. This waste requires disposal, and so it is thrown into the rivers. He

thinks that even the administration doesn't know what to do of the waste generated, so they divert the waste, sewage, and sludge to rivers through pipelines.

According to his understanding of depletion of water and deterioration of the rivers, it could be inferred that for him *Kali Yuga* has made humans very materialistic. So, for them, rivers have become a mere source of exploitation. He thinks organizing Kumbh Mela is a way through which the importance of water and its appropriate utilization can be propagated to people.

Photograph 22: A girl holding Kshipra's water during the cleaning process

The next place this study covered was *Simhasta* center in Ujjain where allotment of space to construct tents was taking place. Mr. Shashikant Dwivedi was another respondent who was the secretary of this center. He was surrounded by religious leaders who were requesting for space and the permission to bring their trucks and lorries in which they would carry their belongings as well as accompany their *mandali*[54] to take a bath at *Simhasta Kumbh Mela*.

[54] It is the group of religious leaders in a particular *Ashram* throughout the world.

Mr. Dwivedi mentioned about the preparations for the festival and expected it to be grand as this *Simhasta* would welcome religious leaders not only from India but also from the world. He informed that "there are religious leaders coming from the north-east and there are stalls for eunuch's[55]". He stated this time they were expecting 25-30 lakh population turnout. When inquired about the Kshipra, he informed that the administration is continuously pumping water to the Kshipra through the Narmada river, so there won't be any water scarcity. He also mentioned that the Narmada was the only option to make Kshipra perennial for the month-long festival.

Further, the study explored Gaughat, Mangalghat, Ramghat and Siddhawat ghat as mentioned in Map10. This study observed the arrangements of the festival, and then at night, it took detailed interviews of the people coming to take a bath at these *ghats*. Many people visited Kumbh Mela and took a bath in the Kshipra and treated its water as per their belief, some were acting like they were left in an amusement park, some were intensely worshipping river Kshipra inside its water, some were watching others take bath, and some were sitting outside the river and worshipping the flow of Kshipra river. Through various observations, it could be imagined that there was a distinction in the understanding of rivers in an 18th and 21st century. In the former, the rivers were worshipped because the humans could not find any ways or means to tame them but in the later, the scientific knowledge advanced so much that rivers remained the only source of exploitation. According to fieldwork inquiry, humans in the 21st century are only bothered about the rivers, when they bring devastation through droughts or floods, in that case, they invent a technology to somehow deal with such devastations which further leads to more exploitation of river water and more devastations and the cycle goes on.

[55] (FP, 2016)

Photograph 23: Devotees preparing to take a bath.

Rajnath Saheb (70 years old) was another respondent this study came across who was originally from Bihar. He stated that he had taken a bath in all the three Kumbh Mela's held at Allahabad, Haridwar, and Nasik. Ujjain is his fourth Kumbh Mela after which he thinks he would have tasted all the four drops of nectar *(amrita)* that had fallen through the pitcher (Kumbh) during churning *(manthan)*. He explained the importance of various dates on which one should take a bath; he planned to take a bath on 6th May 2016 which is the date of *Vaishakh Krishna Amavasya*, i.e., another important date of *Shahi Snan* (royal, holy dip). He briefed us about the important dates of holy dip which were as follows: *Chaitra Shukla* 15 (22 April 2016)[56], *Vaishakh Krishna* 9 (1 May 2016)[57], *Vaishakh Krishna* 11 (3 May 2016)[58], *Vaishakh Krishna* 30 (6 May 2016)[59], *Vaishakh Shukla* 3 (9 May 2016)[60], *Vaishakh Shukla* 5 (11 May 2016)[61], *Vaishakh Shukla* 9 (15 May 2016)[62], *Vaisakh Shukla* 11 (17 May 2016)[63], *Vaishakh Shukla* 13

[56] *Shahi Snaan* (Royal Holy Dip)
[57] *Pancheshani Yatra Start*
[58] *Vratparv Varuthini Ekadashi*
[59] *Vaishakh Krishna Amavasya*
[60] *Akshaya Tritiya*
[61] *Shankaracharya Jayanti*
[62] *Vrishabh Sankranti*
[63] *Mohini Ekadashi*

(19 May 2016)[64], *Vaishakh Shukla* 14 (20 May 2016)[65] and *Vaishakh Shukla* 15 (21 May 2016)[66].

Photograph 24: Rajnath Saheb from Bihar came to take a holy dip in Kshipra.

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He considers the Kshipra a closed river which doesn't have water of its own. He thinks bringing the water of the Narmada to the Kshipra increases the holiness of this River. The Narmada for him is much holier than the Kshipra, so bringing the water of the Kshipra to the Narmada would make Kshipra more holy. He was happy with the facilities provided by the administration in this Kumbh. He mentioned that "in this festival, it is easier to get food, take a bath and receive the blessings of the other religious leaders that is why most poor visit Kumbh." According to him the main purpose of participating in Kumbh Mela is to attain salvation[67] or self-realization by redeeming the accumulated sins which are attained by taking a bath in the holy river (also ref. Dubey,2015). In Hinduism during Kumbh Mela the timings and dates which were provided for the people to take a bath reveal the

[64] *Pradosh*
[65] *Nursihn Jayanti*
[66] *Pramukh Shahi Snan*
[67] *mukti*

importance of 'sacred time,'[68] and that timing bestows a human being *moksha* which signifies setting free of the humans from the cycle of birth and death. He thinks, bathing during Kumbh Mela holds importance for people who are superannuated, but for the people of the modern societies, the only thing they find sacred is equivalent to power.

In a process to learn more about the Kumbh of 2016, this study discussed with Suraj Kumar Lone. He explained the importance of Kshipra and how he is not happy with governments diversion project and Narmada Kshipra Simhastha Link Project (NKSLP). He expressed his attachment towards Ujjain in the following lines *"Charo Dhaam ke teerth lakho baar par Ujjain ka teerth ek baar"* which means one can visit all the religious places throughout the world many times but visit to Ujjain once one does not have to visit any other sacred place because this city has all the gods and their temples situated in it. He expresses few names of the places like *Bhoo ki mata* (mother of lands) then *Bhoomi ke putra (Earth's* son) *Mangleshwar Baba* (*Mangalnath* Temple) situated in Ujjain. He also talks about Siddhwat *(Kaal Viraksha*) which is the place where *Kartikeya,* son of Shiva, during his childhood met with an accident while performing *parikrama* (revolution) in Ujjain. He fell in the forests of Ujjain and fainted. Group of seven females while passing through the forest saw him, they breastfed him and then he came back to his senses. After that *Kartikey* stayed in Ujjain for three days and since then *Kartik Mela* is organized for those three days near *Siddhwat ghat. Parvati* mother of *Kartikey* blessed this place with a huge tree; there is a saying about this tree that even though it was cut into pieces by a Mughal Emperor, it grew again the very next day.

Then he also informed us about other places like *Mahakal, Harsiddhi Mata, Kal Bhairav Baba* and *Chakra Teerath* which have their mystery

[68] Ref. to (Brandon,1965)

and holds importance in Ujjain. Elaborating more on Kshipra he narrates another story, saying Kshipra was a farmer's daughter in a village near Indore. Kshipra's father went to visit his friend one day and told her to take care of the cows by taking them for grazing and serving them water. Kshipra being a small girl around 6-7 years old could not remember to offer the cows water, when her father returned from his visit her neighbors saw that she could not offer the cows water and complained it to her father. Her father got angry and began to beat her with a stick, wherever he would hit her that place was sprinkled with water, this way the Kshipra spread herself in the city of Ujjain. He said, "she is the second unmarried river after the Narmada rest all the rivers in India are married rivers."

Emphasising on both unmarried rivers, he stated that the two unmarried rivers could not live together in one place, as there is a saying that two unmarried females fight with each other if they stay at one place. In the same way, bringing Narmada's water to Kshipra will not be fruitful for people as both unmarried rivers will not be able to tolerate each other's traits. When inquired why did the religious leaders agreed to take a bath in Kshipra filled with Narmada's water he assumes they have all been given money to not speak against the government's decision and after all Narmada is the only alternative left as every water body has been exploited so far in Ujjain. The tales shared by Shri Suraj Kumar Lone showed his genuine concern about the loss of sacredness of the places that held importance in the history of Ujjain city. He was also concerned about the degrading holiness of this city and its river.

This study also inquired from the other priests performing rituals on the banks of Kshipra about the importance of *Ramghat*. A priest named Someshwar Maharaj expressed *"kshipra sarvatra puniyayam brahm hatyo paap harni Avantika cha vishesya cha Kshipra uttar vahini",* through this verse *(shloka)* he tried to express that Kshipra is the river

which provides salvation *(moksha)* and also forgives the one who has killed a brahmin during warfare example Rama being a Kshatriya (which is the second caste in hierarchy) killed Ravana who was Brahmin which is the caste of a priest and comes first in the hierarchy of the caste system. To ask for forgiveness, he took bathe in Kshipra in Ujjain, since then it is called Ramghat. He also told us that Kshipra is the only river which flows towards the north. He further explained that the Ganga is the river which takes away the sins of the people and the Kshipra is the river which leads to salvation. The Ganga had to come to the Kshipra to attain salvation as it is called *"moksha dayini*[69]*".* He mentioned that throughout the *Mela Kshetra* there were five important *ghats* where a person must take a bath to make his pilgrimage successful these places were Triveni ghat, Gaughat, Narsinghghat, Ramghat and Siddhwat ghat. For Shri Someshwarji River Kshipra still had its relevance, he said water doesn't change the holiness of a particular river rather rivers make it their own. This means that if water has been brought from the Narmada and is poured into the Kshipra, it becomes the Kshipra's water. He expresses that water has a quality of taking the shape of any place where it flows, so it doesn't matter in which form it is brought to Kshipra. He also mentions that being a Hindu, it is important to keep these rituals alive by feasible means. He considers Narmada Kshipra Simhastha link one of these means.

[69] Bestows salvation

Photograph 25: Someshwar Maharaj near Shanti peeth, Ujjain

During the *Shahi Snan,* this study explored the idea behind Naked Yogis being the first ones to take a bath. The study came across six Naked Yogis (*Naga Sadhus)*, who were passing through the *Bhuki Mata Ghat*. Inquiring about the purpose of their visit to Kumbh Mela, they that they have to go through strict penance to become Naked Yogis, they have to give up all the worldly ties that they have had with the society to become one of these Yogis. One of them explained to us that at Allahabad, Nasik, Haridwar, and Ujjain where nectar fell during the churning of the pitcher, these places gave rise to four kinds of Naked Yogis. Allahabad Kumbh has *Rajrajeshwari*[70] type Naked Yogis, Haridwar has *Barfani*[71] Naked Yogis, Ujjain had *Khuni*[72] Naked Yogis, and Nasik has *Khechadiya*[73] Naked Yogis, this group which we were talking to was *Barfani* who came from Haridwar.

[70] King like traits
[71] Peace loving; clam and composed
[72] Violent in nature
[73] Doesn't really have any specific trait

Photograph 26: Naked Yogis applying ashes to their body before the holy dip

They stated their contribution in *Kumbh Mela* through a story which is as follows "Ganga[74] once asked *Brahma* (the creator of the world) about how she will clean herself of the sins which are given to her by the people. *Lord Brahma* told her that after twelve years when Kumbh Mela will take place, then Naked Yogis who have given up the worldly desires will wear ashes as their clothes and will bath naked into her. Only then she would be washed of all the sins that she has accumulated through people". So, Naked Yogis are the once who bath first during *Shahi Snan*, then the other sadhus enter the water of the rivers on which *Kumbh Mela* is celebrated. The discussion with the Naked Yogis develops a belief in the sacred powers[75] which provides them the capacity to soak all the sins of the rivers during Kumbh Mela. These yogis are considered to be away from all kinds of desires, so they become the driving force for the world to stay in sync with nature.

[74] Ganga is considered to be the river which can wash away sins of the humans.

[75] This study has only read, heard and spoken to Naked Yogis and it is unaware of any such miracle that Naked Yogi have performed, for Hindus it is a belief.

Management of Kumbh Mela

This section discusses the management of Kumbh Mela from the administration point of view. To know about the management of the Kumbh Mela, people were appointed to take care of the activities which were taking place during the Mela period.

Lifeguards were appointed at the *ghats*, who were responsible for keeping a check on the people. One of them was named Rajendra Verma; he was 25 years old. He stated that they make sure people take a bath within 10 minutes and come out of the water so that other people can get the chance. They were also responsible for taking care of the belongings of people when they enter the water. The lifeguards were trained to swim in case someone was found drowning. There were a few female lifeguards who were also appointed to maintain discipline near the *ghats*, some of their functions were; they had to stop people from wearing slippers near the *ghats*, using soaps to take a bath in the river water was not allowed and using of plastics to perform rituals was also not allowed. The presence of a lifeguard as both males and females expressed that the administration had a disciplinary committee which appointed a group of people at every *ghat* to take care of the river water and the people.

One of the unique rituals which were performed on the banks of the Kshipra was to roam in a circle holding a nine-yard saree over the head and walking in a line around the banks of the Kshipra offering it a saree. On inquiry about this ritual from the religious leaders who were chanting verses for it explained that "for the people who consider rivers as their mother, they gift her a saree by walking the entire passage of Kumbh Mela, which brings them prosperity."

Photograph 27: Ritualistic practice of draping Kshipra in a saree

Photograph 28: (MPPCB) showing the quality of water during baths.

The study inquired from a few officials about the management of the Kumbh by creating co-ordination with each branch which was responsible for the Kumbh Mela celebration. Mr. Bhavesh Jain sector incharge of one of the ghats told us that there were few problems that he could observe during *Simhastha*, 2016. He said the government had not taken care of the *nallahs* which were flowing at certain sections of the river. He also informed that he found the sewage water which was coming from toilets getting mixed with the water of Kshipra. He was concerned about the purity of the river water of the Kshipra. He said the government had not planned well the diversion of *nallahs.*

Photograph 29: one of the sections of a nallah was mixing with water of the Kshipra

Another official sitting close to him was heading the management section of the ghats his name was Mr. H.L. Yadav. He stated that the *Mela Kshetra* is divided into zones and zones are divided into six to seven districts then only the management of the *Mela Kshetra* could become possible. He informed that sewage line suction machines had been linked to tankers at every ghat. These tankers once filled take the sewage and poured them to the sewerage lines provided for accumulation of waste produced during Kumbh Mela celebration.

Marketisation of Babas and Sadhvi's and their sermons

This section elaborates more on Kumbh Mela as a field for *Babas* and *Sadhvi's* to attract more followers and to create an impact on Hindus through there sermons. In the *Mela Kshetra,* a variety of tents like army officers tent created for the long lives of the army officials. A huge tent of pilot *baba* was observed in the *Mela Kshetra*. Pilot *Baba* was previously Wing Commander Kapil Singh, a fighter pilot with the Indian Airforce. He has established his *ashrams*[76] throughout the world. In his pandal in *Simhasta* 2016, there were national and international devotees who looked at him as an incarnation of God. He is known for performing strict penance inside water, and without air,

[76] Hermitage or a monastery

he is said to have been meditating in gross body and changing into subtle body and is releasing the energy through the causal body.

Another tent had huge posters of *Jai Gurudev* in *Simhastha* 2016. *Jai Gurudev* was also known as Tulsidas Yadav. He started giving sermons from 1952 when people started following him. He was arrested during an emergency in 1975 in India when he was released his followers increased, and today he has followers throughout Ujjain and Indore. He propagates that, "to save the environment it is important to "turn vegetarian", and it is also important to "treat cows as 'mother' who bestows all her affection to humans by providing them milk, dung, urine which has not only domestic use but also medicinal use".

One more tent which could be seen in the Kumbh Mela was of *"Maashri*[77]*"* Ritambara*;* she is also known as *Sadhvi* Ritambhara. She is a religious preacher and political activist. She was criticised for her participation in the demolition of Babri Masjid in 1992 (Makhijani, 2001)[78]. Being a Hindu political activist, she is the member of Vishwa Hindu Parishad (VHP) and Rashtriya Swayam Sevak Sangh (RSS) (Hindu, 2007)[79]. She is the founder of Durga Vahini (Army of Durga), the women's wing in VHP. She is known for emphasizing women's education and women empowerment. She mostly narrates "Ram Katha" and other Hindu scriptures in India and abroad. Her sermons could be heard loud and clear as she knows how to convey her message to the public, she has grief and pain in her voice which makes people

[77] Mother
[78] (Makhijani,2001)
[79] (Hindu, 2007**)**

feel that she desperately wants people to get connected to God so that she/he can find solace.

Photograph 30: Hawan Kunds which were created to perform rituals during Kumbh Mela

Photograph 31: People bathing at the Ramghat

There were 13 akharas with well-renowned *sadhus* and saints who were also delivering their sermons to the devotees who visited *Simhasta 2016*. The posters of the religious leaders and their slogans were printed and were visible at every nook and corner of the mela. It seemed as if the *Mela Kshetra* and Festival of Kumbh was market for religious leaders to make themselves famous and propagate there understanding of Hindu religion and gods to the dedicated followers.

Propagation of the slogan of "Green *Simhasta*"

This section discusses the propagation of the slogan of "Green *Simhasta*" from the administration. It talks about the grounds on which pillars of "Green *Simhasta*" were built.

Mr. Shiv Raj Singh Chauhan, the chief minister of Madhya Pradesh, called Ujjain Kumbh Mela of 2016 the "Green *Simhasta*" (TOI, 2016)[80]. It was called "Green *Simhasta*" because of the following reasons: "use of plastic in Mela zone was banned, biofuel vehicles were used to commute in the *Mela Kshetra*. Responsibility to keep the *Mela Kshetra* clean was taken over by *Dera Sacha Sauda*. Regional solid waste management was united under the Public Private Partnership model and was constituted to make local bodies free from garbage (Simhastha, 2016)[81]". Mr Chauhan requested the religious leaders and saints to discuss issues like "how to save earth's existence", "value-based lifestyle", "women power" and "basic tenets of religion" in their sermons so that they can motivate the people to make India a better place to live in (Newsroom 24x7, 2018)[82]. This idea was followed by religious leaders discussing these points in their sermons.

Adding on to the other initiatives of "Green *Simhasta"* it was observed that there was a water aid tent. Speaking to Jagdish Verma informed that he was circulating the information regarding sanitation that is related to utilization of latrines in their homes and its benefits. He was a group of five people in the tent, and they were providing information about the ten different steps of washing hands before eating food or after attending nature's call. He also informed that in *Simhasta,* Ujjain

[80](TOI, 2016)
[81] (Simhasta, 2016)
[82] (Newsroom 24x7, 2015)

Municipal Corporation is responsible for checking the quality of water which is available for taking a bath.

The study interacted with other devotees who came from Indore, Kolkatta, Gurgaon, Meerath, and Vadodara to take a bath on the banks of Kshipra. All of them came to seek blessings from the religious leaders and the Kshipra. They said that there is a religious significance in taking a bath into the river and it also creates happiness as it brings the entire family together. Some families stated that the initiative of Mr. Chauhan to make this *Simhasta* Green has come true. They also mentioned the water aid tent and other tents which were propagating the idea of "save the earth, plant trees and save water."

Insights from the field work

Kumbh Mela signifies full pitcher fair. It symbolizes the abundance of river water. This festival is a way to show gratitude to the gods for "bountiful water." But the situation which was in the 18th century is currently different. Today the rivers like Kshipra have become non-perennial and carry sewage and waste for eight months when it doesn't rain. Mostly the people visiting to take a bath into this river do not know about drying of these rivers. But the organizers know about the massive public anger if the water is missing altogether. Hence government comes up with short-term solutions, which are tough to sustain like Narmada Kshipra Simhastha Link Project (NKSLP) and Khan Diversion Project (KDP).

In Ujjain, the upper reaches of the Kshipra carried just sewage five months before the *Kumbh* was organized. Then the MP government implemented this ambitious scheme to transport five cusecs of water every day from the Narmada near Omkareshwar to Ujjeni village 50 km away where Kshipra originates. From there the water had to travel another 50 km downstream to reach Ujjain city. The water was pumped

through a concrete closed pipe, lifting it 350m from the Narmada to Kshipra so that pilgrims to the Kumbh Mela were able to take a holy dip (Sarkar, 2016). Himanshu Thakkar, the coordinator of 'South Asia Network on Dams, Rivers, and People' expresses in an interview that "this pipeline project from the Narmada to Kshipra was a result of skewed priorities that just wanted to keep a large number of expected pilgrims happy." An ascetic from Uttarkashi Badal Nath says, "since the river water in the Kumbh Mela is Holy to the Hindu it is they who should demand that the rivers are properly cared for. They should take action to safeguard our religion and tradition" (Sarkar, 2016).

Further in a process to organize Kumbh Mela construction of 46000 toilets that generated 50 tons of waste were poorly constructed and so all the waste was draining into the river.. 2500 farmers livelihoods were affected because the agricultural lands were used for *Simhasta* purposes. The loss of farmers for a year was about Rs. 60,000 per *beegha* [83] (0.33 acres) and nobody cared to provide them with compensation for their loss. All the grazing land was removed for *Simhastha*. About 1000 livestock around the Gaughat area was affected, their owners had to 'spend Rs. 200 to Rs. 300 per day' to feed their animals which added a financial burden on farmers. Giant pumps were used to lift 5,000 liters of water per second from the canal fed by the Narmada, carrying it about 30 miles to pour into the Kshipra headwaters. Through this project pilgrims and merchants of Ujjain were happy but down in the Narmada Valley, there was a little cheer. Since March, the canal which fed farms in 13 hamlets went dry. The government told the people the water would return once Ujjain's pilgrimage ends (Purohit, 2016) but they had to suffer loss for the time when *Simhasta* was held.

[83] Unit in Hindi to provide the measure of the land

The slogan of "Green *Simhasta*" for Kumbh Mela 2016 was a mere slogan as the focus was not on the rejuvenation of Kshipra rather it was to fulfill water requirement for people to take a bath through cost-effective projects. Resulting in green mosses found at certain places of Kshipra in Ujjain could be an example of ignoring the degrading water of the river. The degradation of river Kshipra occurred mainly due to more and more construction and development activities around the river. The construction of new *ghats* and removal of trees and green banks with concrete structures lead to decreasing capacity of the soil to absorb the rainfall. During one-month of Kumbh Mela, there was rainfall on May 6, (20mm)[84] and May 9, (17mm) in the year 2016. This led to muddy water flow in Kshipra near Ramghat and Rinmukhteshwar ghat. It also chocked the sewage pipelines and at certain camps of the saints' water-logging was observed. This affected the biological oxygen demand (BOD) level during bathing (ref Chanda, 2016; FPJ, 2016) which was hidden from the people coming to take a bath in Kshipra.

The quality of air deteriorated at an alarming rate as suspended particles increased in many folds due to traffic blockades, rampant use of adulterated fuel and an enormous number of vehicles entering the city. Mr. Prabol Roy the Director of 'Regional Science Centre Bhopal' said, "due to sudden population explosion, there is surely irreparable environmental degradation which will affect public utilities. The most concerned would be public hygiene. The water resources will be affected very badly, and the quality of the soil will be degraded" (Chanda, 2016). Even though the slogan of "Green *Simhasta*" was promoted by the Chief Minister of MP but observations through field visit, newspaper reports had expressed a different story.

[84] Expresses amount of rainfall

Climate change has affected rainfall which has led to high variability and intensity of rainfall. Today the rivers like Kshipra have become non-perennial and carriers of sewage and waste for eight months when it doesn't rain. Mostly the people visiting to take a bath into this river do not know about drying of these rivers. It suggests that maintenance of the river regarding practices concerning climate change must be adapted in the present scenario. But the government has focused mostly on the score in the form of making water available in the easiest possible way, i.e., through NKSLP. Also, the government made the sacred Narmada water travel to places where there is water scarcity. Therefore, the government made it more of a religious agenda than focusing on water scarcity. In India, anything linked to religion makes it sacred. Hence people did not question the reason behind bringing the water through the pipeline, it instead was considered as a blessing of Lord *Shiva*.

Kshipra river has cultural importance in Madhya Pradesh but for eleven years when Kumbh is not celebrated this river is the carrier of sewage. The effects of depleting ecology of river Kshipra carrying sewage can be referred in fieldwork, in an interaction with the priest at Triveni Sangam. He informed that many fishes died due to chemicals poured into the river in the year 2013 and then again there was a news report of the same kind of incident in the year 2015.

The way river Khan disappeared the similar story is of Kshipra, As the population grew in Ujjain increase in water extraction from the river made it non-perennial. So, every Kumbh from the year 1980 government never tried to revive the river but tried to bring water with the help of technology to fulfill water requirements of people to take a bath in Kshipra river during Kumbh. Bringing water through pipes as it was observed through fieldwork, the people were awestruck by such projects rather than questioning these practices. At first, to get

clearance for NKSLP project from the central government, the state government of MP called it a drinking water project but later it was named as 'Simhastha Link'. The government called it a sustainable project which explains that government has wrong notions of sustainability. Kshipra is a polluted river adding water from the clean river will further create more polluted water. The study emphasizes here that the idea of socio-technical interventions is complex while planning such projects government did not calculate the evaporation and seepage, it did not calculate breaking of the pipelines in between causing water to leak on the way.

After clearance of the project, the state government kept no secret from the people about the fact that Narmada-Kshipra Link Project was to fulfill requirements of '*Simhasta Kumbh Mela*'. It seemed as if to capitalize on the totemic value of the linguistic references; the government added the term '*Simhasta*' in the name of NKSLP. Therefore, it declared its objective loud and clear. The promise of an abundance of water resulting from the project was enough to secure all the seats in the parliamentary elections in favor of ruling party. This project was just a simulation of development to fulfill the requirements of all major stakeholders, especially the ruling state and the corporation. It could not fulfill the requirements of the people, precisely because it is only a simulation, an arrangement made to produce the illusion of development among the residents and villagers for a short period, enough to lure them into electing the party that has created this simulation. Villagers claim that the upcoming '*Simhasta Kumbh Mela*' and the religious lobby associated with this festival was one of the prominent force that led to the completion of this project in record time.

The concerns raised by certain newspapers and some of the respondents in the fieldwork for the NKSLP are the sustainability of this electricity-intensive river linking solution to water problems of this area and its

environmental impact. The state government overlooked both these aspects in a hurry to finish the project before the election commission's moral code of conduct' was due to be implemented. It is not clear if any Environmental Impact Assessment (EIA) was undertaken, but some activists have suggested that the project was exempted from EIA as it was treated as a drinking water project and therefore it was exempted from such assessment.

The project NKSLP has compromised sustainability alternatives such as watershed development because the focus of the planners is not on rejuvenating the Kshipra on a long-term basis, but to provide water for a short festival period of one month during *Simhasta Kumbh Mela*. Sustainability has often been traded for electoral gains, and one good example of that is NKSLP. The Sisliya Pond (which is a small lake) is filled by the canals bringing their waters from river Narmada through channels that were built in the 18th century by the Holkars. The new canals are under construction and yet to be completed. This makes the drying up of the source pond a very likely situation. Therefore, it can be said that we started with a dry river, and now we have a dry river and an empty lake as the water lifted from the lake to rejuvenate the Kshipra was not sufficient for the river but was enough to dry the lake. In this scenario, the three-stage pumping system remains closed most of the time, and now pumps are switched on only once a while, on important occasions or visit of dignitaries.

Summary

This chapter provides insights into the fieldwork performed for this study. The first part is based on the perception of people on the Khan. Most of the interviews suggest that now river Khan has converted into a drain due to the negligence of ecological and environmental factors by both the administration and the people. Its banks are filled with construction, and it will be very difficult to revive this river. The contribution of the second part is to provide

the details to the Khan diversion project. The insights of this project suggest that the government comes up with quick fixes to manage the dirty water of Khan that is not a feasible solution. Administration through such kind of projects shows that water control is in its hand. So, they can decide the path of the river. The third part provides the changing practices of *Simhasta Kumbh Mela.* The stress of population turnover increase in construction of ghats on the banks, deforestation near the banks to beautify the *Simhasta Kumbh Mela* region has caused even more stress not only on the river but the soil and air equally.

Chapter 6: Findings, Conclusion and Future Research

The title of this thesis "From the backyards of the city, the river sings the blues" has been derived from Paley's (2008) animated film "Sita Sings the blues". In Paley's film, Sita reacts to her tragedy of being abandoned by Rama which is a famous story of the Hindu epic the Ramayana. This study discusses abandoned rivers which lie decaying in the backyards of the city after years of exploitation. Though the derivation is not very similar to Paley's, but through this title, the thesis expresses that the human beings have used the rivers in such a way that today they have become "subaltern" rivers and are deprived of representation. The river which were once like a friend, philosopher and guide to the people have now turned into sewage carriers.

Further, this thesis on 'socio-technical interventions on "subaltern" rivers' has explored the ideas and apparatus of governance of "subaltern" rivers in India. It addresses the concern of how the smaller tributaries that flow through a city disappear in the form of a *nallah* and the government's attempts to become 'visibly invisible'. This study suggests a conceptual framework to govern rivers rather than using only technological interventions to address the deterioration of rivers.

Technography provides us a framework through which both technical and non-technical components can be addressed so that society can know what is wrong with its governance techniques that are responsible for the sad demise of the smaller tributary rivers. Therefore, the focus of the concluding chapter is on theoretical and analytical strengths of technography to provide a researchable space that secures and carves out for itself in analyzing the models that government should use to solve the increasing challenges of water scarcity.

Section 6.1 details the main findings of the study which are the reasons for the disappearance of the rivers in India. Section 6.2 provides the concluding

remarks about the mournings of "subaltern" rivers like the Khan and the Kshipra. Section 6.3 provides suggestions and recommendations which can be used to draft a policy for rivers in the future. Section 6.4 which is the last section of the thesis, provides specific themes which could form the basis of future research.

6.1 Main Findings

Using the three components of technography which are ethnography, biography, and technology the following findings could be highlighted in the thesis:

6.1.1 Categorising the minor rivers as "subaltern".

This study develops a conceptual category of subaltern rivers which can be useful in the research on river governance in India. The Khan and the Kshipra are termed "subaltern" in order to emphasize their under-representation in research, because of which, they have turned into a sewage. The neglect of these rivers has caused water scarcity in districts like Indore, Ujjain, and Dewas. The government, as well as the people, have forgotten the significance that these rivers once held. The way policies, programs, and schemes are designed to manage water in Madhya Pradesh, has included all the elements of exploiting the water resources one by one rather than reviving them.

6.1.2 Once perennial now a drain

These rivers have had a glorifying past, and they still hold cultural importance in the life of the people. But the change in their condition was noted when after the industrial revolution, the development activities took place like illegal construction on the banks of these rivers, deforestation from the banks, discharging waste into the river by industries, lack of regular maintenance of the sewage pipelines and soil exhaustion that drained the ecological system of these rivers. Also, the commercialization of cities led to

a change in occupation dependency. Earlier and even today these rivers are treated as “goddesses” and “mother”, but this vestigial belief has not changed anything for the rivers, they still remain a drain.

6.1.3 Increasing alienation between nature and humans

For engineers, these minor rivers are the channel carrying run-off which needs to be utilized by constructing storage and diversion structures. Most people living on the banks of the Khan and the Kshipra think that it is a drain carrying the waste of the city. For builders, these rivers are just a menace as it regularly floods the land on both sides which is reclaimed for urban, commercial or industrial developments by creating embankments and landfills. These catchments have been occupied by humans, and these rivers are forced to flow like a narrow stream. These diverse interests of human beings have made them forget that rivers are the life support system and habitats for some 15 % of all the living organisms on the earth.

6.1.4 Less focus on accumulation and storage techniques

Water is an essential component for maintaining adequate food supply and productive environment not only for humans but also for animals, microbes, and plants. As population and economies grew in the cities of Indore and Ujjain, the freshwater demand also increased. Neglect of the water bodies that these cities already have leads to water shortages that severely reduced biodiversity in both terrestrial and aquatic ecosystems. While water pollution of the Khan and the Kshipra in Indore and Ujjain spread diseases, it also depletes the groundwater quality.

6.1.5 False interpretations of socio-technical interventions and techniques

The technical interventions like the construction of tanks to transfer water from one river to another is a popular technique of the

government of Madhya Pradesh. For example, using water from the Gambhir river to facilitate the requirement of water for the people of Indore and Ujjain. Further, the earlier two phases of bringing water from the Narmada had already taken place and then they recently drew the third phase of water which included NKSLP. Besides to prevent the Khan drained away from the Kshipra for Simhastha, they constructed the Khan diversion project using a pipeline. The technological interventions used so far by the MP government can be associated with centralism and state-dominated large-scale infrastructural development typical of the 'hydraulic mission'. The way they have been managing the water of a basin is in a way providing immediate solutions haphazardly. The government of Madhya Pradesh has been experimenting for quite long regarding governing rivers in India while across the globe the governance paradigm has widened the vision from river being a localized geographical entity to the river as an ecosystem.

6.1.6 Lesser importance to theoretical approaches and dominance of empirical methods

In the field of research about the "subaltern" rivers, most of the research fetishizing pollution has been through chemical, and biological studies. There have been few or no studies on social, political, cultural, environmental and ecological aspects of these rivers. Thus, is also one of the reasons why "subaltern" rivers are disappearing. Inadequate research on non-technical components has failed to disclose the intensity of the problem and its complexity.

6.2 Conclusion

In this thesis, an attempt has been made to develop a theoretical knowledge/conceptual framework through which technical and non-technical aspects can be combined to understand that human beings and nature are part of an ecological system. This study is part of environmental sociology that reveals the paradigms of sustainability that have been used till now, but it has not been able to deliver to its intended objective. The propagation of sustainability focusing only on modern science rather than cultural, religious, or ideological norms and demanding a wholesale departure from the capitalist growth economy and consumer culture, has rendered the paradigm acceptable to a wide range of societal actors who had previously been divided by deep ideological rifts.

Arguably, the strength of sustainability has been its openness to diverse interpretations of exactly what sustainability may imply politically and, accordingly, its ability to accommodate the change of social values and identity needs in the post-ecologist constellation (Bluhdorn, 2016). It is for this reason, in particular, that the sustainability paradigm is set to retain its hegemonic status. The sustainability paradigm has not dealt with issues of power and political actors who have consistently endeavored to block sustainability policies. It has been highlighted that science will invariably remain unable to generate objectively valid eco-political imperatives and uncontested policy agendas, and that sustainability research will have to acknowledge that ecological communication is, at its root, always about the perceived violation of socially negotiated norms. The present study thus makes an observation of the consequences of technical understanding of the rivers in the urban areas.

The study discloses major factors responsible for the deteriorating conditions of the "subaltern" rivers. For instance, in the case of the Khan, the major culprits are the domestic and individual waste, continuous expansion of urban areas and hyperactivity of construction on the watershed of the river, which has in many instances, simply ignored the river channels and their "right of

way." Roads and buildings stand right over these channels (originating from the Ralamandal Hills area, and Pipliyana Lake) which once were feeding the Khan with freshwater every monsoon. Hence, the load of sewage and industrial waste in the Khan has increased with increasing urbanization of Indore, over the last two decades; at the same time, the rivulets earlier feeding the Khan river have been gradually lost to expanding sub-urban gated communities and residential/commercial constructions.

In the case of the Kshipra which is as sacred as the Ganga comes to limelight once on every twelve years, which is neither sufficient nor sustainable. All the efforts of rejuvenating this river begins at eleventh hour, as it would be a matter of embarrassment for the government if it will not be able to provide water to take bath during *Simhasta Kumbh Mela*. The festival of *Simhasta Kumbh Mela* is a political necessity which gives rise to simulative development projects, which bear all the symbols of a lucrative proposal but in concrete terms deliver only very little of the proposed outcomes.

A simulation of river's cleanliness, preparedness and development is created with the help of high budget schemes, invocation of religious symbols, strategic usage of print and electronic media, and depoliticized governance mechanisms, which in reality only serves the purpose of expanding the power of involved strategic groups. Once the grand religious fair of *Simhasta Kumbh-Mela* is over, the Kshipra disappears into oblivion once again for the next twelve years and continues with her everyday work of carrying the industrial wastes and urban sewage in silent acceptance, which is resulting into her gradual demise. It also points to some of the reasons that explain why the sacred rivers in India including the Kshipra, the Ganges and the Yamuna, among many others, remain heavily polluted irrespective of the numerous developmental programs and huge funds that have been spent on cleaning of these rivers till date. The river acts as the instrument of exploitation, which is presented in different lights at different stages of implementation, depending on political requirements. The project of transfer of water from one watershed

to the other uses depoliticization as a strategy of implementation, while the end product in the shape of a visible 'confluence point' of the two holy rivers is highly politicized and publicized to serve the political purpose of the expansion of the state power in this region of Malwa.

In this regard, Catton and Dunlap's model (1993) specifies the development in the cities through three competing functions of the environment that serves human beings: supply depot, living space, and waste repository. As a supply depot, the environment is a source of renewable and non-renewable natural resources (air, water, forests, and fossil fuels) that are essential for living. Overuse of these resources results in shortages and scarcities. Living space or habitat provides housing, transportation systems and other essentials of daily life. Overuse of this function results in overcrowding, congestion and the destruction of habitats for other species. With the waste repository function, the environment serves as a 'sink' for garbage (rubbish), sewage, industrial pollution and other by-products. The exceeding ability of ecosystems to absorb wastes, results in health problems, thus leading to the formation of toxic wastes and ecosystem disruption (Dunlap, 1993).

Furthermore, each of these functions competes for space, often impinging upon the others. For example, placing a garbage landfill in a rural location close to a city makes that site unsuitable as a living space and destroys the ability of the land to function as a supply depot for food. Similarly, urban sprawl reduces the amount of arable land that can be put into production while intensive logging, threatens the living space of native (aboriginal) people (Hannigan, 2006).

Man's alienation from nature in the urban capitalist economy gives rise to apathy/disconnect from natural resources/rivers which then suffer from exploitation and neglect, resulting in their gradual demise. Global capitalism has disconnected the local livelihoods from local resources (e.g., land, water, etc.) which then fell into exploitation (and pollution) for monetary gains. Therefore, the "subaltern" rivers have stopped playing an active role in the life

of the average city dwellers, though it still plays a very important role in collecting the waste of the city.

A living river can take many forms. At some point, people can also begin to call a living river a dying one, and in the process, the status and cultural category become defined and fully featured. The general meaning of a ‘dying river’ is that the sustainable features of the living system are disrupted and altered by human interventions to the extent where aquatic life and human life can no longer be sustained. By labeling a river ‘dying’ river, humanity can be altered and forewarned about a possible disaster that may cause large-scale changes to an ecosystem. A dying river can, therefore, be an anticipatory category, one that describes an important, but still an under-defined condition.

A dying river can at times look like a living river, as the Khan and the Kshipra rivers do during the monsoon when the increased flow conceals all kinds of ecological and hydrological distress. The bottom line, however, for annual water availability is experienced during the long, lean season. This is when water resources are seriously compromised by upstream withdrawals, wastewater inflows, and any other uses/ withdrawals of river water that adversely affects the flow or alter water quality (Alley, 2015).

This study discloses that the development of an understanding of the anthropogenic structure of water is necessary to help human beings be able to consume it. Rather than going to the river to bring water, the water is fetched to their utility areas through several technologies which beguile the genuineness of nature. These structures provide comfort to the people, but they ignore the anthropocentric or nature-centric ideas. For instance, while constructing a bridge, the engineer does not pay attention to the reactions of such constructions on the water bodies nearby.

The countries hydraulic systems these days are the symbols of power that indicates subjugation of nature to fulfill human needs and to create aesthetic beauty. A ‘built environment’ is solely the product of culture, but a

‘waterscape-built environment’ will never be as the flow of water cannot be restrained by any limitations. The physical and modified waterscape can be perceived through ‘managed’ and ‘non-managed’ resources. But both ‘managed’ and ‘non-managed’ are contradictory to each other as the former varies synchronically and the later diachronically. To manage the physical and modified waterscape, it is also important to question what constitutes management which only comprises technical components and not the non-technical components in India.

Following on these lines, all societies have been adapted to, use, exploited and modified water in their environments according to actors’ technological know-how, cultural traditions, and religious-ideological worldview (Tvedt, 2010, p.146). Each period constructs the river by its official discourse and presents the river as a suitable recipient of grants under one scheme or the other. Each developmental discourse constructs the river as a kind of object of knowledge and creates a structure of knowledge around that.

Institutionalized production of certain kinds of ideas about the “subaltern” rivers has important effects, and that the production of such ideas plays a key role in the production of certain sorts of structural change. It can be argued that as the government and public construct a river it, in turn, becomes as the time passes. Nature is transformed, and both reality (of the river) and its interpretation (as a drain) transforms the facts and replaces them with new “facts”.

The disappearance of rivers from the urban landscapes can be seen as a three-stage process. In the first stage, the river loses its identity as a stream as more and more people and industrial units begin to dump their wastewater, sewage, and effluents into its rivulets. In the second stage, the stream acquires a new identity as a “drain” as more wastes from different parties find their way into the river. In this stage, the filth of the streams makes their presence felt by emanating a strong stench, which hangs in the air all around it. In the third stage, the state identifies the open drain as a health hazard and initiates the

process of channeling the sludge carried by the stream through underground pipelines, which are then released into the rivers outside the urban zone.

The lifecycle of "subaltern" rivers provides evidence of the everyday disappearance of streams flowing in Indian cities. The increased dumping of sewage in the river in the last two decades has shrunk its physical expanse, changed the quality of water and obstructed its free flow. The second stage can also be observed in the changed identity of the "subaltern" rivers, i.e., for instance from the Khan river to the Khan "drain". The third and final stage can also be partially observed in the diversion project of the river during the *Simhasta Kumbh Mela* when the government had tried to contain the river in the pipelines as it was found to be extremely polluted and unfit for merging with the Kshipra during this occasion. In this phase, the Khan did not exist as a river anymore but as sewage carrying drain, which was to be concealed from the public eye with the help of underground pipelines.

The Khan river is in the third stage of the process of becoming extinct, where the river transformed into a sewage and wastewater carrier in the first stage, has now acquired the unbearable stench of a drain, which is considered as a health hazard. In the next decade, there would only be underground pipelines, where the streaks of water that make the Khan would be found. Both governance strategies and discursive reformulations have led to the formation of the Khan "drain" and reduced it to a nameless sludge contained in pipes below the ground which once was a flowing river.

The degradation of these "subaltern" streams in Indian cities convey that environmental sustainability has become the prime victim of economic liberalization. Over the past two decades, India's natural resources have been subject to a systematic assault. Time and again, the state has granted clearances for new industries, mines, and townships without any thought for our long-term future as a country and a civilization. Technical developments have had its edge in India to enhance ecosystem services. This has resulted in negligence of empirical observations which create a scope for these technical

developments. Landmark developments are of course important; but every one of these major advances in understanding, as well as the development of techniques based on them, have taken place outside India. Importing these techniques could bring considerable benefits to India, but that should not be the sole context in which India employs modern science and technology. Rather India must get down to applying the scientific methodology across the length and breadth of the country in enhancing ecosystem services, not necessarily in spectacular leaps and bounds but by slow, steady increments (Gadgil and Guha, 1995).

The current system of governance has utterly failed to accomplish its goals. The irrigation engineers take care neither of the catchment nor the distributaries, so that dams silt up at far greater rates than projected, while large parts of the lower command areas fail to receive any irrigation water. Soil conservation measures are prescribed without considering the nature of the substrate and are so sloppily executed that they often enhance, rather than reduce, the rates of soil erosion. The departments prescribe a standard, rather heavy, doses of fertilizers and pesticides with no reference to the field-to-field variation in many relevant factors such as levels of soil nutrients, or factors that vary from day to day such as levels of pest populations.

While natural resources are everywhere treated in this sloppy fashion, the technocentric agencies make bogus claims of scientific management. These have no substance, for these agencies do not maintain any careful data on the state of the system, they do not monitor whether their interventions have indeed been corrected for any deviations between the projected and realized outcomes. Rather, state agencies employ the jargon and prestige of science to cover up for their stark inefficiency and wastefulness of the technocratic management of India's natural resources (Gadgil and Guha, 1992; Singh, 1994).

An alternative strategy of providing useful information inputs needs to be put in place. This should be a system attuned to expose rather than obfuscate what is happening to the resource base; that would look for state funds; that would

try to work out a program of timely, small appropriate interventions to make the most of the potentialities of variable natural systems. Such a program of injecting scientific inputs would not be glamorous, and its results would have very limited international recognition. Nor would the prescriptions generated create large opportunities of profit for omnivore enterprises.

In a densely populated country like India, environmental issues have both an ecological and a human dimension. Programs to clear-cut natural forests and replace them with exotic species deplete the soil even as they deprive peasants of access to fuel, fodder and artisanal raw material. Mining projects, if not properly regulated or carried out with state-of-art technologies, ravage hillsides and pollute rivers used by villagers downstream. In this sense, in India, environmental stewardship is not a luxury, but the very basis of human survival (Guha,2014). In order to sustain its resources, it is important to reach beyond the sheer reproduction of neo-emancipatory discourses, and beyond contributing to the governance of unsustainability. It needs to break out of the mainstream of technocratic thinking, economistic analysis and its assigned role as a policy advisor to the governors of unsustainability.

This thesis emphasizes on the importance of an interdisciplinary approach which includes technical and non-technical components in which environmental crisis occurs. It needs to take into account there subjectivation of eco-politics, the particular conditions under which it occurs, and the new eco-political constellations and social practices which it entails. As the politics of unsustainability continues to unfold, this interdisciplinary approach will have to retain a critical ambition which will focus on unpacking the prevailing societal self-descriptions and investigating the communicative strategies that facilitate the governance of unsustainability. This thesis is an attempt to create a scope for more theoretical approaches to deal with the challenges the "subaltern" rivers are facing in India. It opens the scope for non-technical components and their importance in understanding the environmental crisis. It

also discusses the way natural resources are governed in India and how can these patterns change.

6.3 Suggestions and recommendations

This study provides certain suggestions and recommendations to improve the governance of rivers in India, these are as follows:

- Rivers should be considered a key component while implementing any technology related to it, under the broader purview of concurrent socio-technical situation. Water has always been an essential component for the survival of the human beings, production of food, maintaining the balance through water cycle that creates those geographical conditions to make living possible. In the current scenario, water resources like rivers are declared as living entities. If these resources have such a crucial role to play in our day to day lives, it is important to understand their complexity before any technology is implemented on them.
- There should be a procedural explanation of complexities created by technologies on the intersectionality of society and water resources.
- At the time of technological intervention, efforts should be made to develop a societal triad which gives relatively equal importance to the Society, Technology as well as to the Water Resources.
- The requirement of more conceptual frameworks and theories to develop a relationship between society, water resources, and technology to make this complexity easier.
- Need for mapping of the changing course of the rivers (as rivers like the Ganga that change their course with time). It reveals true intricacies of the river flow as headwaters feed consecutively larger tributaries to surrender their water to the mainstream.
- In the present scenario, India requires soft technology that include the human areas of strategy development, decision-making, concept formation and training to laminate the hard technologies
- There should be a basic acceptable level of water quality all through the river which would decrease the degradation of river water; there should be an increase in the formation of STPs proposed under different

plans of river cleaning. The stretch of the river considered for cleaning should not be the main river only, but it should also include all possible tributaries and streams of that river.

- The requirement of effective river basin organizations at both the center and the state level.
- The requirement of a paradigm shift from a technocratic approach towards more socio-ecological and integrated river management approach.
- To increase the effectiveness of the schemes created for major rivers, it is mandatory to reach out to the sub-tributaries first so that upstream, downstream communication could be maintained.
- There should be a procedural explanation of complexities created by technologies on the intersectionality of society and water resources.
- The requirement of more conceptual frameworks and theories to develop a relationship between society, water resources, and technology to make this complexity easier.
- The requirement for remedial programs which have public participation as an integral part starting from planning to execution.

6.4 Future Research and Limitations

While studying the river governance in India this study provides future scope for research in this field. The study suggests that there is a requirement of exploring the idea of "subaltern" for rivers even more. Though this study has tried to analyze the issue from all possible points through which a river could be categorized as "subaltern", this idea needs to be explored and exploited more so that it becomes a concrete idea which could help future researchers. Besides, since this study categorizes minor rivers "subaltern", it requires more such minor rivers to be studied and explored so that the ecology of rivers could be maintained. Rivers like the Gomti in Lucknow, the Coovum in Chennai, the Mutha and the Mula in Pune and many such known and unknown rivers and their tributaries need to be explored.

It also advocates enhancing the scope for river governance in India through creating more theoretical approaches to understand the mechanism of rivers in India. For instance, this study expands the idea of technography to analyze river governance in India. In that same way, there are requirements of more theoretical approaches to justify the stand of empirical data. This study would further explore those areas in India where there are some successful cases of river governance in India using society and technology interaction.

This study limits itself in understanding the problem of river governance in India. By understanding this problem, it is easier to know why plans, policies, and programs created mostly for the major rivers are unsuccessful. This limitation also highlights the harmful effects of technological interventions on nature.

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