

Chapter 2

Analytical Approaches to River Control

Abstract This chapter discusses in detail the analytical framework used in this work. A discussion of the World Commission on Dams process and response is used to identify the gaps in existing approaches. This is put into context using the Bhakra project as a case study. The combination of political ecology approaches and Foucauldian discourse analysis is proposed for an examination of discursive and political functions of river control, with a special focus on the role of expert knowledge.

Keywords World Commission on Dams • Political ecology • Bhakra • Expert knowledge • River control

This chapter is used to develop a framework that is appropriate for the analysis of river control in India. First, I critically examine the process and analytical strategy of the World Commission on Dams (WCD) for the examination of large dams all over the world. This report ([World Commission on Dams 2000](#)) is the most comprehensive examination of river control that has ever been attempted and one which also sets high standards for any follow-up exercises. With the benefit of hindsight, not only the process but also the long-term impact of WCD can be examined. More than a decade later, a distinctly different outcome of the process can be observed, when compared to the positive expectations that immediately followed the publication of the WCD report. There is a broad consensus that while the recommendations of the commission continue to be relevant, the implementation has been weak ([United Nations Environment Programme 2010](#)). I argue that one of the most important gaps between implementation and expectation is that the discursive aspects of large dams were not given enough attention. The availability of higher-quality data on the real performance of large dams across the world was not sufficient in itself, to affect the belief of experts in the efficacy of large dams, and in fact may have hardened the opposition between governmental and civil society actors.

To establish the importance of examining the discursive aspects of river control, I follow up with a discussion of the celebrated Bhakra project in India. This examination uncovers the nonfunctional aspects of large dams, by identifying their discursive and political functions within social relations of power. These aspects were left unexamined by the WCD, with the examination limited to the technical, social and environmental aspects of large dams.

2.1 The World Commission on Dams

2.1.1 Origin

The controversy over large dams had become increasingly intense by the 1990s, and their image had lost the lustre of the Tennessee Valley Authority (TVA) days. In 1995, the new president of the World Bank, James Wolfensohn, announced his intention to undertake a review of the development effectiveness of large dams. Consequently, a review of large dams was undertaken by the independent Operations Evaluation Department of the World Bank. The first-stage internal review of 50 World Bank-assisted large dams found that, whereas 90 % of the dams met the standards applicable at the time they were approved, only 26 % were acceptable against the standards applicable in 1996. However, the review also concluded that mitigation of the adverse social and environmental consequences of large dams would have been both feasible and economically justified in 74 % of the cases (Dorcey 1997).

At the same time as this internal revaluation of large dams took place, the World Bank was facing increasing external opposition to the projects it was assisting, most notably against the Sardar Sarovar project on the Narmada river in India. Against this backdrop, the IUCN–World Conservation Union sought to create an institutional partnership with the World Bank and involve various stakeholders in consultations to break this stalemate. The key recommendation of this process was to create a World Commission on Dams, with the objective to review the development effectiveness of large dams and to develop standards, criteria and guidelines to inform future decision making (Brinkerhoff 2002).

2.1.2 Process

The WCD process was remarkably inclusive, with 12 commissioners coming from government, industry, academia, NGOs and social movements. The commission was also praised for its inclusiveness, transparency and independence (Dingwerth 2005), while the WCD model was regarded widely as a unique experiment in global public policymaking (Bandyopadhyay et al. 2002; Brinkerhoff 2002; Dubash

2009; Srinivas 2001). The WCD report lay down the five key principles for decision making: equity, efficiency, participatory decision making, sustainability and accountability. The commission also worked on creating an extensive “knowledge base” on large dams. The work programme for the knowledge base comprised 8 case studies; 3 country studies; 17 thematic reviews on social, ecological, economic, financial and institutional aspects of large dams; 4 regional consultations in Colombo, São Paulo, Cairo and Hanoi; and a cross-check survey that included quantitative data on 125 dams. In addition, the WCD accepted 947 submissions from individuals and institutions (World Commission on Dams 2000).

At the end of a 2½-year consultative process, the WCD produced its final report *Dams and Development: A New Framework for Decision-Making*. The report consisted of two parts—the first summarised the findings of the various studies and the second part, “The way forward”, contained “internationally acceptable criteria and standards”, as well as 26 guidelines for future dam projects. The report had the consensus of all 12 commissioners, which was a major achievement considering the at times fractious process of commissioner selection and the diverse interest groups they represented. The consensus among such a diverse group shows that “the Commission did transcend, rather than reproduce, fractures among interest groups in the dams debate” (Dubash et al. 2002).

2.1.3 Response

This consensus among the commissioners, however, did not extend to the stakeholders in the dam debate. The reception of the WCD report was varied. Civil society groups generally welcomed both the findings and the recommendations for the future (McCully 2001), while, conversely, the World Bank, dam industry organisations and the governments of China and India had reactions ranging from lukewarm to extremely hostile. To take the example of the World Bank, at the launch of the WCD report in November 2000, the bank’s president, Wolfensohn, stated that he would consult its shareholders regarding the WCD recommendations. In March 2001, the bank stated that it would not “comprehensively adopt the 26 WCD guidelines”, but would use them as a reference point when considering investments in dams. However, in the Water Resources Sector Strategy (WRSS) of the same year, the World Bank argued for a “high-risk, high-reward strategy” that generally lowered even the existing standards for economic, social and environmental performance. This prompted the 12 WCD commissioners to write in a letter to Wolfensohn on 12 July 2002:

Given that a major thrust of the WRSS is to recommend that the Bank actively reengage in financing large-scale dams (referred to in the WRSS as high-reward / high-risk hydraulic infrastructure), we think that it is unwise to dismiss without justification or explanation the recommendations of the first-ever global review of dams reached through consensus and developed through an extensive participatory process with support from the World Bank. (cf. Bello and Guttal 2006, p. 77)

Although the future recommendations of the WCD were praised by many civil society actors, they were criticised in equal measure for being inapplicable, contradictory and not deriving from the studies in the first part of the report. It was suggested that this may have been due to the short time available for the completion of the study, as well as perception gaps between stakeholders. According to these critics, the commission had failed to come up with practical and applicable guidelines, and following the guidelines would make dam building impossible (Fujikura and Nakayama 2003, 2009; Nakayama and Fujikura 2006). In addition, the WCD was also attacked for being “antidevelopment”, overstepping its terms of reference and indulging in “politics”:

[C]onsider the oft-repeated terms such as: civil society; human rights; development debate; models of development; water as an instrument for peace; planning process; participatory and inclusive approach; transparency; equity; governance; political corruption; arrogance of bureaucrat – technocrat – politician nexus; and so on... Did the [terms of reference] not encourage the reader to expect the report to tell him why and how to go about making ‘better dams’ to avail of nature’s bounty, if not tame its fury, rather than telling him almost to forget about dam building? (Thatte 2001, p. 345)

The controversy over the “political” aspect of the WCD report can be traced back partly to the commission’s view that the technical information about dams already resided with professional dam associations, such as the International Commission on Large Dams (ICOLD) and the International Hydropower Association (IHA). Therefore, WCD members decided to focus on “those key issues around which there is greatest disagreement” (Dubash et al. 2002, p. 47).

2.1.4 WCD in Retrospect

Whereas critics decried their lack of scientific credibility, it was their very political commitment that made these guidelines progressive in terms of social and environmental justice. The WCD was expected to resolve a long-running and global controversy through evolving a consensus among stakeholders, as well as policy guidelines that would derive their legitimacy from democratic consultation. The commission did a commendable job in fulfilling its strategic objectives of achieving a consensus and democratic legitimacy. Nevertheless, the impact on institutional policies was negligible. The WCD set an example for global policymaking and of achieving legitimacy through public participation; this did not, however, translate into significant institutional change in most cases. The biggest contribution of the WCD to the large dam debate was that it uncovered the deeply political and subjective nature of dam building; it dispelled any illusions that river control was a purely technical and apolitical exercise. The next section takes this further and argues dams are more than technical structures and are also objects of discourse, using the case of the Bhakra project that became an icon of modernity for India.

2.2 Bhakra–Nangal Project: Temple or Dam?

The previous section has pointed to the shifting discourses and diverse meanings associated with dams, which are seen not merely as technological artefacts, but in administrative parlance are associated with powers to initiate “development”, remove backwardness and make a state modern. The WCD focused on the material effects of large dams, whereas inadequate attention was given to the discourses that lead to their legitimisation. The consequences of this lack of attention are apparent when some of the responses most critical of the WCD report are considered. The response by the Ministry of Water Resources, Government of India, for instance, is illustrative of this point:

The references relating to India in the report are not based on factual and authentic information... The guidelines for development now suggested by the WCD in their final report are wholly incompatible with our development imperatives. Having made impressive strides since independence in developing our water resources, India proposes to continue with its programme of dam construction (...) to ensure continued self-sufficiency in food grain production and to meet the energy and drinking water needs of a growing population. (Sekhar 2001)

The close connection between development and dams, and the deeply held beliefs in their efficacy in solving a multitude of problems, can be seen in this response. In a sense, it is indeed impossible for a country to have development without dams, as both are part of the same discourse (Escobar 1995). The iconic Bhakra–Nangal project¹ in India has often been cited as incontrovertible evidence of the effectiveness of large dams. The most notable example of this is seen in the judgement of the Supreme Court of India (SCI) approving highly controversial river control projects on the Narmada river, when it justified the construction of large dams by stating:

The construction of Bhakra Dam is a shining example for all to see how the backward area of erstwhile undivided Punjab has now become the granary of India with improved environment than what was there before the completion of the Bhakra Nangal project. (Supreme Court of India 2000, p. 73)

Indeed, if Bhakra is examined using the WCD’s rationalistic approach of evaluating direct costs and benefits, then the project’s performance has been above average. The people displaced cooperated with the government regarding “resettlement”, and more than half a century later 93 % of the originally displaced people have received some form of resettlement (Narain 2005). On the benefits side, there has been an increase in the irrigated area, and the project’s command area has seen an increase in food production. However, if we take a political ecology approach and see the Bhakra project not as an isolated technological artefact but as a node

¹The Bhakra–Nangal project consists of the 225 m high Bhakra dam on the Sutlej river, while 13 km downstream is the 29 m high Nangal barrage. The project includes two power stations and canals. It is hereafter referred to as “Bhakra”.

in the intersection of flows of capital, ideologies, politics, technologies, knowledge and, of course, water (Swyngedouw 1999), a considerably different, and much more complex, picture emerges.

2.2.1 Historical Background

Originally proposed by Sir Louis Dane in 1908, in colonial India, as a good site to build a dam, a detailed report on the feasibility of building a dam at Bhakra was prepared in 1910. It was rejected at the time for being too expensive, but the proposal was revived by Chief Engineer F. E. Gwyther in 1915, and a detailed and expanded project plan was prepared in 1919. This project was also shelved, but geological and other investigations were conducted, at almost the identical site where the Bhakra project finally came up. The year 1927 marked the beginning of American influence on the project when engineers from the United States Bureau of Reclamation (USBR) joined British engineers in formulating the plan for a larger dam at the site. After a period of stagnation, the idea of the dam was again revived by a prominent regional leader Sir Chhotu Ram in 1938 when parts of Punjab faced a drought (Kudaisya and Tan 2000, p. 133). In 1939, a detailed project report for a 152.40 m high dam was taken up by Dr. A. N. Khosla, then the superintending engineer, and later a powerful member of the Indian hydraulic bureaucracy as the first chairman of the Central Waterways, Irrigation and Navigation Commission (CWINC). For the first time, the project included a hydroelectric component in addition to the originally planned sole function of irrigation. In 1944, under conditions of limited Indian self-rule, Dr. J. L. Savage, the then chief engineer of USBR, was requested by the Punjab government to examine the site for the feasibility of construction of a dam. After geological investigations conducted by an American expert, a detailed project plan for a 482 m high dam was prepared by an engineering firm from the USA. This same firm prepared revised designs and plans after the Punjab government decided to raise the planned height of the dam to 513 m (Bhakra Beas Management Board 2009).

In 1951, a revised project report was prepared for the 207.26 m high, straight gravity dam. The final project proposal comprised the following units:

- Bhakra Dam and Power Plants
- Nangal Dam
- Nangal Hydrel Channel
- Ganguwal & Kotla Power Houses on the Nangal Hydrel Channel
 - Remodelling of Ropar Headworks
 - Remodelling of Sirhind Canal
- Bhakra Canals
- Bist Doab Canal
- Transmission and distribution system of electrical energy
- Development of markets and communications of Bhakra area

Eventually a 225.5 m high concrete dam was constructed at the planned site on the Sutlej river, which is approximately 350 km north-west of Delhi. Partial filling of the reservoir started in 1958, but the dam itself and the first powerhouse were completed in 1963, and the second powerhouse was completed in 1967. The reservoir created by the dam covered an area of 168 km² and had a capacity of 9.34 km³, of which 7.43 km³ was the available live storage. In the short term the main challenge for project was the resettlement of the 36,000 people affected and the additional task of relocating the historical town of Bilaspur. The immediate impacts that were noticed were the growth of aquatic weeds downstream; damage to migratory fish species downstream; drastic changes to the flora and fauna, including the extinction of some plant and fish species; and the interruption of timber transport networks. But the most worrying problem in the long term was the high sedimentation rate of the reservoir. An average of 36.8 million m³ of silt was accumulating in the reservoir annually in the period 1959–1969, which indicated a loss of storage at the rate of 0.5 % every year (Rao and Palta 1973).

A 3-year study of Bhakra led by Shripad Dharmadhikary (2005) traces the history of Bhakra to interstate water disputes between unified Punjab and Sindh in British India. As the upper riparian province, the Punjab government used the plans for constructing a storage dam on the Sutlej river at Bhakra as a bargaining chip to establish its greater need for irrigation as compared to the lower riparian province of Sindh. These disputes continued after the division of Punjab between India and Pakistan. The Indian government impounded the flows of Sutlej and Ravi into Pakistan in April 1948, drying up the canals in (Pakistani) West Punjab. Although India claimed this was done due to the lapse of an agreement on maintaining river flows, it was widely believed that this action was revenge against the Pakistan-backed invasion of Kashmir (Guha 2008, p. 175). This was soon followed by the beginning of work on Bhakra, and the ensuing protests by Pakistan resulted in arbitration by the World Bank. This, in 1960, resulted in the Indus Waters Treaty, giving India exclusive use of the Sutlej, Ravi and Beas rivers; Pakistan was granted the use of the Indus, Jhelum and Chenab rivers. The building of Bhakra also strengthened India's negotiating position on the use of Sutlej waters, as otherwise Pakistan would have gotten a much larger share of the river waters, based on historical use. However, as Dharmadhikary (2005) points out, the construction of Bhakra did not bring any new area under irrigation, but merely shifted the irrigation from one set of areas (mostly in Pakistan) to another (in India). This means that, unless one takes a position sanctifying artificial nation state boundaries (e.g. Rangachari 2005), Bhakra's contribution to irrigation is questionable.

The notion of "scarcity", which is often another key argument used to support large dams, has been questioned both in broader philosophical terms (Xenos 1989) and more specifically with regard to water (Budds 2008; Iyer 2004; Mehta 2001, 2003, 2007). However, in the case of the Bhakra command area, even the scarcity argument was clearly untenable due to already existing irrigation infrastructure in the form of canals. The increased irrigation only became fully available from 1970 onwards, when restrictions on the Indian use of Sutlej waters were lifted under the Indus Waters Treaty. While this increased irrigation intensity was not necessary for

agriculture as it was practised earlier, the greater availability of canal water fulfilled one of the essential conditions for the use of “High Yielding Varieties” seeds for agriculture. This is the reason why Bhakra is often credited with ushering in the Green Revolution discussed below.

2.2.2 Dams and the Green Revolution

The Bhakra irrigation system follows a strictly rotational system for the supply of canal waters, proportional to land holdings (*warabandi*). However, a study by [Sakthivadivel et al. \(1999\)](#) found that instead of equitable water supply per unit of command area, 70 % of the areas with good quality groundwater consistently received low canal water supply, whereas only 9 % of areas with saline or poor quality groundwater received low canal water supply. This suggests that contrary to the claims of canal waters recharging groundwater, which is then used for irrigation (e.g. [Bhatia et al. 2007](#)), canal waters are used to *supplement* groundwater irrigation in areas with good quality groundwater, and in areas with poor groundwater quality, canal waters are used as a substitute. The unsustainability of such an irrigation regime is borne out by the phenomenon of deep and falling water tables in areas with fresh groundwater and rising water tables in areas with problems of salinity and waterlogging. Although separate figures for the Bhakra command area are not available, a study by Indian Space Research Organisation (ISRO) using remote sensing data gives an overview of waterlogging due to irrigation projects at the national scale. The study conducted between 2003 and 2008 found that out of the total command area of 88.89 mha served by major and medium irrigation projects, an area of 1.7 mha was waterlogged. This amounts to approximately 1.9 % of the total area under irrigation by medium and large projects, and of this 1.5 mha was affected seasonally, and the rest perennially.²

The easy availability of canal waters and cheap (at times even free) electricity for pumping groundwater were necessary inputs, but were not by themselves sufficient for the Green Revolution. In addition, high quantities of fertilisers, pesticides, mechanisation and the *timely* availability of water were necessary. The high cost of these inputs was defrayed partly by government subsidies on fertilisers, electricity and tube wells, cheap institutional credit for the mechanisation of agriculture and minimum support prices for the purchase of food grains. This regime led to a decrease in crop diversification ([Singh and Sidhu 2004](#)), with the share of cropped area under cereals rising from 45 % in 1960–1961 to 78 % in 2000–2001 ([Gill 2005](#), p. 224). This loss of diversification had the unintended effect of reducing room for manoeuvre for farmers, and they became locked into a spiral of increasing costs of inputs, with stagnant or declining returns. The financial returns per hectare

²Indian parliament, 15th Lok Sabha, unstarred question no. 1567, “Water logging and drainage system” answered on 22.03.2012.

cultivated declined by 2.18 % per annum for wheat and rice through the 1990s, and in the case of cotton, by as much as 14.24 % per annum (Ghuman 2008, p. 12).

The prevalence of indebtedness amongst farmers in the region is high, with farmers in Punjab having the highest outstanding liabilities compared to other states of India (National Sample Survey Organisation 2005, p. 26). The majority of this borrowing is for operational farming expenses, and more than half of it is obtained from non-institutional sources, which usually attracts extremely high interest rates. Farmers get trapped in the spiral of increasing input costs, increased borrowing and repayment of interest, into further degrading the environment. Using a political ecology approach, it becomes clear that farmers (land managers) are forced to keep producing a surplus and end up extracting this surplus from the environment, thus degrading it. It is difficult to pin down the exact contribution of irrigation to the agricultural and socio-economic changes in the area; however, a controlled study of two villages in the region, one irrigated by the Bhakra Canal and the other nonirrigated, found high levels of agricultural intensification in the first and greater economic diversification and nonagricultural skills in the second (Groenfeldt 1984). This result hints at the role of Bhakra as an important step in a developmental path, which has led to the present-day crisis of agriculture in the Indian states of Punjab and Haryana, with the associated high ecological and social costs. The problems associated with the development path epitomised by Bhakra have become increasingly obvious to farmers in Punjab. Now there are civil society efforts like the Kheti Virasat Mission (KVM) to reverse some of the damage to the environment by reverting to traditional agricultural practices that do not require intensive irrigation and high cost inputs (Grewal 2008).

2.2.3 *Dams as Discourse*

In the light of the Bhakra example, the Indian government response to the WCD is based more on the unchallenged “myth” of large dams, rather than a comprehensive and careful evaluation of their performance. This does not mean that the beliefs underlying dam building can be dismissed; on the contrary, they are a vital component of the debate on river control. Future discussions on large dams must therefore dissect the beliefs and meanings associated with dams as much as their economic, social and political aspects. This scrutiny is essential, not in order to distinguish “true” beliefs from “false” ones, but rather to identify how and why certain narratives acquire their certainty and legitimise or reinforce existing inequalities. The rationality behind the construction of large dams is very concisely reflected in a signboard promoting the Sardar Sarovar project on the Narmada river that refers to food security, national pride, prevention of the “waste” of river waters, prosperity and well-being of the population.

Further, when the ecological effects of large dams are considered in the context of Anthropocene changes to the world’s river systems, the national scale predominantly used by the WCD for its analysis also becomes problematic. In his discussion

of the relevance of the nation state for an understanding of global environmental problems, Dalby first gives examples of the enormity of human role as geomorphic agents:

Can we imagine the huge conversion of fossil fuels into carbon dioxide as literally turning rocks into air on a planetary scale, because that is what we are in fact doing? As geomorphic agents human excavations of mines and quarries, and the transport of these materials all over the planet in tankers, freighters, pipelines, trains and trucks, now dwarf 'natural' processes. (Dalby 2007, p. 112)

Although the geological and geomorphic impact of river control is not discussed by the author, its impact is of no smaller magnitude. Through actions like altered stream flow, sediments trapped in reservoirs, coastal erosion in deltas due to absence of fresh deposits and ocean ingress and altered seismicity due to reservoir load and changed flooding patterns, the geomorphic functions of rivers have been transformed. In the light of the planetary scale impact of human activities reflected in the use of "Anthropocene" as a descriptor of the present geological era, Dalby goes on to argue:

[This] requires a shift of focus away from geographies of administration in terms of blocks of space and a recognition of how economic and ecological phenomenon are about connections, links and consequences that flow across these boundaries. (Dalby 2007, p. 114)

When this recommendation is adapted to the analysis of river control, although the "flows across boundaries" are important, the role of nation states themselves, as agents and not as units of analysis, is no less important for the study of river control. This is the reason that whereas Chap. 3 focuses on flows across boundaries, Chap. 4 focuses on the equally important function of the nation state in *structuring* these flows. Whereas it was progressive in terms of global environmental politics, the WCD was reliant on the international legal framework based on the state system, which is quite inadequate for the task of understanding ecological change on multiple scales and distinct dimensions. On the other hand, this is complicated by the fact that the symbolic aspects of large dams are closely connected to these very arbitrary territorial entities of nation states. This dilemma can, to some extent, be addressed by directing the "hatchet" or critical attention of political ecology (Robbins 2004) towards the central role of the state in the construction of large dams in Asia. The solution-oriented or "seed" aspect can then focus on a multitude of scales, varied both spatially and temporally.

2.3 Political Ecology as an Analytical Approach

Political ecology as an approach is a promising way of understanding the connectedness of planetary-level changes with human social, political, cultural and economic practices on all scales. According to the classic definition by Blaikie and Brookfield, political ecology

... combines the concerns of ecology and a broadly defined political economy. Together this encompasses the constantly shifting dialectic between society and land-based resources, and also within classes and groups within society itself. (Blaikie and Brookfield 1987, p. 17)

However, the understanding of political ecology has changed considerably since then (Blaikie 2008; Bryant 1998, 1999; Forsyth 2003, 2008; Peet and Watts 1996, 2004). Below, I first discuss the development of political ecology in generational terms, identifying some key conceptual and theoretical shifts, and follow it with a discussion focused on poststructural political ecology, especially the elements that are directly relevant to a study of river control.

2.3.1 *Antecedents*

Biersack (2006) describes a “first-generation” political ecology that dates to the use of the term “political ecology” by Eric Wolf (1972) in his discussion of the pressures of social arrangements on local ecosystems, though the term itself had been coined much earlier by Thone (1935). In a work that was a forerunner of a broadly critical stance towards the then dominant neo-Malthusian stance on ecology, Enzensberger (1974) used a Marxist position to draw attention to the relations of exchange at the heart of environmental degradation. He further criticised the bourgeois environmentalism epitomised in Ehrlich’s (1968) description of the “Population Bomb” and especially the manner in which it depoliticised environmental degradation. However, the first major work that clearly distinguished political ecology from other modes of examining human–environment relations and laid down basic research methods was the work of Piers Blaikie (1985) on soil erosion in sub-Saharan Africa. The key characteristics of this work were a theoretical commitment to neo-Marxist positions, especially world systems theory and dependency theory. One of the key insights of this early political ecology was that local ecological changes needed to be understood in the context of global relations of power. There was an emphasis on how incorporation into global capitalism led to increasing pressure on local “land managers” to produce surpluses, leading them to extract “surpluses” from the environment and thereby degrading their local ecologies (Blaikie 1985; Blaikie and Brookfield 1987).

Another concept that was central to the analytical framework was the concept of “marginality”. Marginality drew attention to the idea that the least powerful members of society, in political and economic terms, were likely to be the pushed away to the least productive or marginal land. This becomes a self-perpetuating cycle, because “land degradation is both a result and a cause of social marginalisation” (Blaikie and Brookfield 1987, p. 23). Both these concepts emphasised that contrary to a simplistic idea of impact on the environment being a result of an increase in population, environmental degradation was driven by political and economic inequalities at diverse scales. This brought attention to the fact that firstly, different members of society had different impact upon the environment.

Secondly, environmental degradation did not merely have proximate causes, and its causes could be located in structural inequalities both within and between different societies.

Naturally, while drawing attention to previously overlooked phenomena and identifying connections between disparate processes, early political ecology lacked the reflexivity to identify key limitations in the research focus that arose due to some hidden assumptions:

In the first generation of political ecology . . . the land managers were almost wholly male, Third World subjects and curiously unpolitical in their practices and intentions. (Watts 2008, p. 260)

Further, this first-generation political ecology continued to rely on an essential nature, external and separate from humans, in its search for structural solutions. In sum the most important criticisms were that structuralist political ecology

. . . lacked politics, faced insuperable methodological problems of proof (and ultimately of persuasion), and asserted its own meta-narratives, thereby silencing local and alternative voices. (Blaikie 1999, pp. 132–133)

As many of these weaknesses became obvious, both newer practitioners and new concepts attempted to overcome these limitations while maintaining a continuity with earlier insights and approaches. It was argued that whereas political ecology had begun by focusing on society and nature interactions in the context of power relations, considered within the frame of political economy, it should henceforth also take into account “the discourses and practices through which nature is historically produced and known” (Escobar 1996). The resulting shift in focus is discussed below.

2.3.2 Poststructural Political Ecology

Building upon Biersack’s (2006) generational metaphor, Escobar (2010) states that the succeeding “second-generation” political ecology arose from the various currents of post-Marxism, postmodernism, postcolonialism and poststructuralism, thus shifting the field away from “chains of explanations” that relied on a purely political economy perspective. The term “poststructural political ecology” is commonly used to describe this work, as it is the broadest description that subsumes a number of strands of political ecology, while giving adequate attention to the main difference with early political ecology, namely, the move away from purely structural explanations. According to Escobar, what distinguishes this generation from the preceding is “its engagement with the epistemological debates fostered by the theoretical positions known as constructivism and anti-essentialism” (Escobar 2010, p. 91). One of the most significant changes in the field was the resulting shift in focus away from the uncovering of underlying political and economic “structures” that were reproduced as environmental change.

Poststructural political ecology attempts to understand how the unequal power relations amongst social groups, and the “knowledge” that mediates human–environment interactions, are reproduced as present-day ecological changes on all scales. One of the major contributions of this second generation was to draw attention to language as a constituent of reality. This can be seen in the way some political ecologists refused to investigate “taken-for-granted” problems and instead focused on the very *framing* of problems by deconstructing different ideas like “wilderness” (Cronon 1995), “national parks” (Neumann 1992) and “forest fires” (Kull 2002). An excellent example of the contrast between the first and second generations can be seen in the relatively unreflective use of the ideas of “Third World” (Bryant and Bailey 1997) and “developing countries” (Bryant 1999) when compared to Escobar’s (1995) argument that the “Third World” was an invention and “development” was a deeply political exercise. Similar to earlier political ecology, these critiques were not merely theoretical, but attempts were made to show that the framing of an environmental problem could have cascading effects on the ground and worsen existing inequalities.

Generational classifications³ are useful in order to identify shifts in response to changing environmental and social contexts as well as theoretical shifts within the disciplines. But a major weakness of such categorisations is that they imply a teleological progression of both theory and methods and assume a consistent *improvement* of political ecology as an approach. However, these generational shifts describe not so much an improvement, as a *robustness* of political ecology as a field of inquiry, and highlight its capacity to adapt to changing requirements of research. Another false impression that a generational metaphor gives is that such changes were driven by successive generations of scholars, whereas in reality, the *same* practitioners often shifted their focus and direction so that their work might be said to span “generations”. Another important aspect that the generational metaphor overlooks is that many of the structural approaches used in early political ecology have not been *superseded* by poststructural approaches and continue to have explanatory relevance (Andersson et al. 2011). One way to address these deficiencies is by complementing this discussion of discontinuities, with a discussion of connections and collaborations which is taken up in the next section.

2.3.3 *Interdisciplinarity*

The robustness of political ecology is not only due to its ability to adapt to changing theoretical and research requirements but also due to the cross-fertilisation of research with insights from diverse disciplines. This approach is useful in identifying the multiple disciplinary strands that intertwine to form political ecology

³Escobar (2010) goes on to argue that a third-generation post-constructivist political ecology is in the making, however one whose contours are still unclear.

as a field of inquiry. Working together with other disciplines can offer hybrid methods of work that can benefit from different approaches, disciplinary strengths and complementary insights. [Lau and Pasquini \(2008\)](#) suggest that ideally interdisciplinarity can

... reduce segregation of knowledge by building workable bridges between otherwise compartmentalised knowledges, with the objective of integrating ideas, concepts, and methodologies from various disciplinary traditions in order to promote a more complete understanding... leading to an ever more productive hybridity of disciplines, capable of analysing and perceiving a complex world in a comprehensive, nuanced, holistic and sensitised manner. ([Lau and Pasquini 2008](#), p. 554)

However, the authors go on to caution that there are numerous problems in achieving this in practice, and the positioning of interdisciplinary scholars, within and beyond their disciplines, plays an important role in the negotiation of the constantly shifting boundaries of interdisciplinarity. One example with the possibility of fruitful collaboration between disciplines is set out in an agenda for a political ecology grounded in geography set out by [Zimmerer and Bassett \(2003\)](#), while making it clear that this was only *one* approach that was complementary to the many other variants that coexist. The authors propose that a geographical approach to political ecology can offer

an analytically and methodologically sophisticated framework at the interface of social and natural sciences that differs from more largely social scientific studies as well as more strictly ecological ones. ([Zimmerer and Bassett 2003](#), p. 16)

They further elaborate that two themes central to such a geographical approach are “social–environmental interactions” and the “political ecology of scale”. One of the points that they make is that such research should require physical geographers and human geographers to work together. This aim is appreciable and is in line with the possibility of environmental geographers acting as a bridge between human and physical geographers ([Cooke 1992](#)). However, far more important is the attention that the authors’ draw to the important contributions that geographers (both human and physical) can make to political ecology. Extending the importance of collaboration beyond the discipline of geography, [Blaikie](#) argued that the promise of political ecology lay in a marriage of poststructuralism and interdisciplinarity and brought with it

... the possibility of a closer and more fruitful engagement of natural and social sciences than hitherto, of new and innovative ways of understanding alternative constructions of nature and society, and of critique of authoritative knowledge and unequal power, both discursive and material. ([Blaikie 1999](#), p. 144)

There has certainly over the last few years been a move to make political ecology more relevant in solving real-world problems while still retaining its critical edge ([Blaikie 2008](#); [Bryant and Goodman 2004](#); [Robbins 2004](#); [Robbins and Monroe Bishop 2008](#); [Walker 2006, 2007](#)). [Robbins \(2004\)](#) describes the complementary roles of political ecology as being that of a “hatchet” in its use as critique and also that of a “seed” through its commitment to equitable and sustainable solutions to

environmental problems. Both these roles are not only appropriate in the case of the large dam debate but also complementary. As discussed earlier, one of the major limitations of the World Commission on Dams was the lack of critique of the *idea* of large dams, solely focusing on an evaluation of their functioning, in political and social terms. In this work therefore, this is replaced by a broader analytical framework built upon poststructural political ecology that can form the basis for understanding the connectedness of the social, economic, political and ecological impacts of river control. This analysis can then extend the understanding of the meanings and discourses of river control, rather than seeing them as self-evident or irrelevant.

The WCD process was mostly focused on an examination of the *effects* of large dams, yet an examination of their *causes* is just as important. With the use of a political ecology approach, the economic and political inequalities reproduced as environmental change, as in large dam projects, can be scrutinised. However, a limited political ecology approach may fail to uncover the discursive and symbolic role of dams. A more classical political ecology may tend towards a highly structural explanation that emphasises power relations and economic factors (e.g. Nüsser 2003), but it is important to point out that human–environment interactions are mediated by knowledge. Therefore, an investigation of the process of knowledge construction and underlying discourses needs to be integrated into any understanding of ecological change (Bryant 1998; Escobar 1996; Peet and Watts 1996, 2004). This is why a *poststructural* political ecology can help uncover the role of not only asymmetric power relations but also that of asymmetric knowledge relations in influencing human–environment relations.

Political ecology remains a field in development, and it does not have prescribed research methods or an overarching coherent set of key theories. The diversity of perspectives and backgrounds of political ecology practitioners is, however, a strength in itself and opens entry points from which varied stakeholders can participate. For instance, the element of political commitment/activism that is an intrinsic part of political ecology provides an excellent arena for academic practitioners and activists to work together, something that is especially relevant in the context of a highly charged and politicised discussion of large dams. The collaboration in knowledge production by activists of the *Movimento dos Atingidos por Barragens* (the Movement of Dam-Affected People) and Brazilian academics documented by McCormick (2009) is an illustrative example of the possibilities of such cooperation.

2.3.4 Approaches Relevant to River Control

There is a considerable body of existing research, which is of direct relevance to a political ecology approach to river control, which can be divided broadly into three major sets. The first category derives from the long tradition of hazards research,

especially work related to the framing of floods and drought, which can be used to analyse the legitimisation of large dams as infrastructure necessary to prevent natural disasters (Blaikie et al. 1994). An example of such work in South Asia, influenced by the seminal contribution of Gilbert White to hazards research in the USA, is that of Daanish Mustafa (Mustafa 1998, 2002a,b, 2007; Mustafa and Wescoat 1997; Wescoat et al. 2000). Especially interesting in the context of river control is his notion of “hazardscape”, which builds upon insights from hazards research (especially pragmatism), political ecology and “socio-nature” (Mustafa 2005).

The social nature tradition, also sometimes called “socio-nature”, has given rise to the second set of work that can make contributions to the dam debate (Budds 2004, 2008). The notion of a socially constructed nature builds upon the idea that there is no nature separate and external to man, and all nature is known only through social and discursive practices (Kaika 2006; Swyngedouw 2004, 2009). This notion does not negate the materiality of nonhuman natural entities like rivers, but it does deny the possibility of knowledge of such entities that can transcend human social practices to separate the material from the discursive. One of the most important elements of this tradition is the notion of a dialectically produced socio-nature, as opposed to natural resources that are contested over by humans (Robbins 2004). A further implication of this is that natural entities like rivers are not to be seen as inert objects, but as having agency on their own. This insight is something sorely missing from the deliberations of the WCD, thereby weakening its analysis.

There are significant consequences to ignoring the social aspects of the environment, as it creates binaries in which something is *either* artificial *or* natural, contrary to the assertion by proponents of socio-nature that there is nothing “unnatural” about dams and embankments. Even more importantly, it was argued that even well-meaning Northern environmentalists were to blame for sentimental attachment to “myths” about nature, for example, that of the “tropical rain forest”. As Stott asserted,

‘Tropical rain forest’ does not exist as an object; it is a human construct and is thus subject to myth making on a grand scale. . . these myths have become examples of what are termed ‘hegemonic myths’, which exclude other myths from world policy debate. (Stott 1999, p. 8)

In a comprehensive examination of this idea, Stott (1999) traced its emergence as *tropischer Regenwald* in the work of Andreas Schimper in 1898 and its continued influence a century later. For example, in 1998, the biggest anxiety of a large majority of Germans was the perceived destruction of the “tropical rainforest” and was strongly reflected in the rise of Green politics. Stott (ibid., pp. 23–25) found that this “myth” was composed of four categories of signifiers: *orientalism*,⁴ seen in the use of words like exotic, “idyllic” and “mysterious”; *climax* signifiers like “harmony” and “equilibrium” based on ecological ideas of Schimper and others;

⁴This is derived from the work of Edward Said (1979). See also the closely related work of Arnold (1998, 2000) on the construction of the tropics, or what he calls *tropicality*, that builds upon similar premises.

old age signifiers like ancient and “primeval”; and *vulnerability* signifiers like “exploited” and “destruction”. The author concluded:

We have constantly and wilfully misread other peoples’ landscapes; we have appropriated their history and so often proceeded to replace it with a false history of our own construction. (Stott 1999, p. 45)

The outcome of this “misreading” was that the powerful environmental NGOs like Greenpeace sought to maintain the areas identified as “tropical rainforest” in a false state of permanent stability. Not only did this framing reduce these areas to the status of a museum meant to preserve a primeval nature, it also labelled the inhabitants as either exploited victims or as greedy destroyers of ancient forests. All such constructs ultimately end up justifying external intervention and remove agency from local people, shifting it to external actors and local officials (Fairhead and Leach 1995, 1996). The reason these discourses need to be deconstructed is that neither narratives justifying external interventions nor those justifying preserving harmonious local practices were capable of explaining environmental change at the local scale. This means that these discourses need to be seen not in terms of their contribution to knowledge, but in terms of their contribution to existing power relations. Dividing environmental discourses into a technocentric managerial approach and a populist romanticising approach, Adger et al. (2001) present evidence showing the inapplicability of either at the local scale. They also identify the disconnect between policy institutions and local conditions, which is especially problematic in light of the strong policy impact of both populist and managerial discourses.

The proponents of the idea of a social nature offer an alternative way of approaching the relations between humans and rivers. For instance, Swyngedouw (2009) asserts that new hydroscaapes constructed by humans are produced through the interaction of social and biophysical processes and straddle the perceived nature–society divide. This offers the possibility of an approach that combines the observations that rivers are produced through biophysical processes like precipitation, snowmelt and the geomorphology of riverbeds and watersheds. These processes are given a meaning that is socially produced, which might identify these rivers as “flowing waste to the sea”, “sacred”, “mother”, etc. These and many other meanings can coexist, and they form the basis for the subsequent relation with the river (Lahiri-Dutt 2000), and the political struggle here is not only over the resources associated with the river, but more importantly over the meaning of the river itself. This can be observed in the struggles between those who might want to “save” the river (from what? for whom?) and those who want to “use” (for what? for whom?). Seeing rivers simply as resources that are contested over overlooks the fact that people are often not fighting to gain a greater share of the resources, but to preserve a certain meaning of the river.

A third set of relevant research draws upon the insights drawn from Michel Foucault’s work on governmentality and knowledge/power (Foucault 1991, 2007, 2008) as applied to the environment. This literature has been variously called eco-governmentality, green governmentality and environmentality (Darier 1998; Luke

1995a,b, 1999; Rutherford 2007). This literature examines the role of institutions, which through the use of “expert knowledge” construct an “environment” that can then receive various forms of management and intervention—all in the interest of governing its constituents. Typical of this is the work of Michael Goldman (2001a,b, 2005, 2007) that examines the role of the World Bank in producing environmental knowledge and how this was related to its interventions in the hydro-politics of the Mekong region. This idea is closely connected to what Adger et al. (2001) identify as environmental discourses that create the justification for external, technocentric interventions. Eco-governmentality more clearly focuses on the ways environmental discourses are embedded in social relations of power and the ways in which they are deployed to shape human relations, and most importantly by closing off certain forms of action and opening up other more easily managed actions. Rutherford (2008, pp. 139–205) describes how a Disney theme park informs visitors about the “threatened” environment and informs them of important ways in which they can “save” it by throwing garbage in the bin and recycling. This recognises the agency of the visitors but directs it into a channel that might prevent more substantial change like questioning the economic processes that produce garbage and the consumerism that sustains garbage production. The author offers the following description of green governmentality:

[Green governmentality] renders nature visible and intelligible, generates experts to define and explain its ‘truths’, assembles technologies of power, cultivates strategies for intervention, articulates biopolitical projects, and fosters particular subjectivities... [It] combines nature, power, and profit to greater and lesser degrees so that the commodification of nature becomes the primary vehicle to understand and rescue it. In doing so, other ways of encountering nature, especially in terms of a more radical environmental critique, are rendered unthinkable. (Rutherford 2008, pp. iv–v)

Zimmerer and Bassett (2003, p. 290) make the important point that an examination of the political ecology of scale can uncover “mismatches between social and ecological scales” which occur when “the spatial requirements of a species or ecosystem do not correspond with administrative levels of management”. This mismatch can worsen existing human–environment relation where social and biophysical processes produce contradictions, something that is examined in detail in Chap. 4 with respect to embankments on the Kosi river basin.

These three sets of research are not completely distinct from each other, and practitioners usually do not restrict themselves to selecting them singly. This categorisation is intended to highlight the multiple perspectives that are possible (and necessary) with respect to discussing the phenomenon of river control. What is common to these approaches is a dialectical view of human–environment interactions, an attention to multiple scales, a critical approach to practices of knowledge creation and a commitment to find equitable, place-based solutions to environmental issues. When seen in the context of the Anthropocene and planetary scale changes caused by river control, it becomes more important than ever to have analysis across a variety of scales, both temporal and spatial (Sneddon 2002; Sneddon et al. 2002). Political ecology as a field is not novel, and neither is poststructuralism; however,

the reason why political ecology is useful as an approach for the study of large dams is because it shares the normative concerns of equity and justice implicit in the WCD's recommendations while offering the possibility of avoiding many of its limitations (Baghel and Nüsser 2010).

The WCD process was a milestone in terms of establishing a nonhierarchical framework for the discussion of a global phenomenon. The commission started its discussion without any fixed notions about dams and demonstrated the benefits of engaging with a diversity of opinions in a mutually respectful manner. A poststructural political ecology can build upon the strengths of this process while at the same time addressing many of the blind spots of the WCD process. An understanding of the political, economic and knowledge relations thus acquired can form the basis for a meaningful discussion of large dams and point the way towards necessary change.

2.4 Foucauldian Political Ecology

Building upon the limitations of the WCD analytical framework and the benefits of the alternative approaches discussed above, in this section, the framework used for this research is developed, based loosely on poststructural approaches. As the discussion above has advocated for a poststructural approach, the examination of the relations of knowledge and power is considered in a spatial context. Although there are several kinds of poststructural political ecology that are possible, one strand that runs through most approaches that examine the role of knowledge and power in mediating human interactions with the environment is the work of Michel Foucault.

His influence on the social sciences in general is well known, and perhaps the most explicit engagement of Foucault with the discipline of geography was in a special issue of the influential French geography journal *Hérodote*⁵ in the form of a set of questions directed at geographers. These questions and their disciplinary relevance have been dealt with by various Anglo-American and Francophone geographers in an edited volume by Crampton and Elden (2007). However, his work in general displays a considerable overlap with human geography as a discipline and is indispensable to a study of relations between spatiality, knowledge and power such as this one (Elden and Crampton 2007; Philo 2000, 2012).

As an examination of the relation between expert knowledge and river control, therefore, this work relies considerably on theoretical insights offered in his work. Political ecology, as discussed above, has been defined in terms of a coming together of a broad understanding of political economy combined with principles arising from the field of ecology. Therefore, below, I first discuss the ways in which knowledge as a category can be considered relevant coming from an ecological perspective. This is followed by a discussion of the role of knowledge in mediating, in the present case, interactions between the river and humans, by

⁵No. 6, 2^e trimestre 1977.

adding a discussion of political economy within which a discussion of river control can be placed. The final part of this section describes how theoretical insights derived from a Foucauldian perspective, especially the three concepts of genealogy, governmentality and subjectivity, can be used to integrate the elements of the environment, knowledge and power.

2.4.1 *Ecology and Knowledge*

Ecology as a term was first used by Ernst Haeckel in 1866 to describe the science dealing with the relationships of organisms to the surrounding outer world (*Aussenwelt*), but the focus in this section is on the role of knowledge within these relations of the organism, here humans, with the control of rivers as a form of relation of humans to their environment. One of the most important concepts, relevant to the present field of inquiry, that emerged from the field of ecology that relates to the *unique* relation between an organism and its environment is that of the *Umwelt* proposed by Jakob von Uexküll (1957). He used the German term, translating it as “surrounding world”, to describe the complete world that could be perceived by an organism through its sense organs. Since different organisms perceived the world differently, it follows that different organisms would inhabit distinct *Umwelten*, even while they occupied the same space, as for instance, a field of flowers would appear quite different to bees and humans, to the extent that they would be two distinct worlds of experience. Further, Uexküll divides the *Umwelt* into two parts, the first of which he calls the “perceptual world” and the second part is the “effector world”. Of these the first he calls the *world-as-sensed*, the sum of all the information received by an organism. This information creates the organism’s inner world (*Innenwelt*). Finally, there is the *world of action*, in which the organism acts upon the meaning it has given to its perception, based upon its inner world of meaning (von Uexküll 1926, pp. 126–127). In case of humans, he extends this to the use of tools like telescopes and microscopes which extend the perceptual world and machines and cars that extend the effector world.

Uexküll (1926, pp. 338–350) discusses the application of the idea of the *Umwelt* to a human community considered as a single organism, rather than a collection of individuals. He uses community in a broad sense that appears to be similar to the idea of an independent polity or a collection of individuals that work together as an organised social and political unit. In keeping with his idea of the *Umwelt*, he proposes that analogous to the sense organs of an organism, the community as organism requires observers:

Accordingly, like every organism, it [Human community] requires sense-organs and a steering-apparatus and special action-organs, in order to ward off hostile attacks, if need should arise. All these organs must be formed out of individuals. (ibid., p. 342)

He however cautions against using just any normal individual as a “sense organ”:

Only such individuals are suited for sense-organs as are specially developed as observers; otherwise they would only involve injury. (ibid.)

These “observers” or “sense organs” of the human community can be understood to be comparable to the experts discussed in this work. Effectively then when seen in terms of an Umwelt, the experts make sense of the universe and thus enable the community to act upon the information that they have produced. Further the special training that Uexküll mentions is similar to the professionalisation, learning and practice that experts have to go through. He implies that this training that makes them specialists in a particular realm also gives them their own specific Umwelten; the astronomer, the chemist, the psychiatrist each of them is able to access a small excerpt of “Nature”, based upon their tools or specialisation (von Uexküll 2010, pp. 133–135). In the context of river control therefore, the experts are the ones that produce a meaning upon which the human community–organism can act. This is of course different from the subjective, individual understanding of a human, with the key difference being that a person’s subjective understanding of their universe can direct their own actions, but the meaning produced by an expert through their special training can direct the actions of an entire community.

The idea of the community that Uexküll is discussing here is the nation, for which he identifies functions analogous to those of the organism:

Gold circulates in the opposite direction to the stream of products, but follows that faithfully in all its ramifications, flowing, like it, in great abundance towards the centre, and so passing from the hands of the many into those of the few. The centralising of gold, however, goes further than that of goods, because it can circulate independently. Thus, special gold-centres develop, which are able to control the exchange of goods over a wide area. (1926, pp. 340–341)

The flow of gold is a metaphor for the economic function within the nation, and he further gives an anatomical description of the polity:

While we may compare the stream of goods and the stream of gold with the streams of blood and fluids in the body, the organs of the administration of justice and of government form the bones of the community, which, by their stability, serve as the support for the ever-changing streams of goods and gold. (ibid., p. 341)

As discussed below, such an anatomical metaphor and description of the human community is strikingly similar to the metaphor used by early political economy literature. And this discussion of the community–organism in the context of the Umwelt is what connects the ecological aspects of Uexküll’s theories with the concerns of political economy as discussed below.

2.4.2 Knowledge and Political Economy

Political economy as a term is quite distinct from what might be thought of as a contemporary notion of a “politicised economy”, or a set of competing actors within

an economy. In fact, as [Mitchell \(2002\)](#) points out, the “economy” as “the totality of monetarised exchanges within a defined space” is a recent idea, whose “creation” he traces to social scientists working in the period between the 1930s and 1950s. He further clarifies that political economy “was concerned not with the politics of an economy, but with the proper economy, or governing, of a polity” ([Mitchell 2002](#), p. 4). The first use of the term “political economy” is traced back to Antoine de Montchrétien in 1615 ([Tomaselli 1995](#)). He was extending the work of famous predecessors like Niccolò Machiavelli, contributing to the genre that consisted of prescriptions given to the ruler on the best way of governing the nation in an era of competing and warring states.

In addition to his ideas setting out the best way of organising resources of the state, regulating agriculture, looking after the civil society and similar prescriptions, what is most striking about Montchrétien’s work is the use of the anatomical metaphor, similar to Uexküll’s use. Equating the *body politic* to a human body, he compares labourers to the liver and blood, artisans to the heart and heat and merchants to the brain and nervous system of the state ([Tomaselli 1995](#), p. 297). What is missing from this, somewhat confused, anatomical description is what Uexküll described as sense organs, specially trained observers of the community—which can, in line with the anatomical description, be identified as experts—the eyes and ears of the state.

When translated to contemporary understanding, these metaphors highlight the key role of experts and their knowledge in helping the state make the best possible use of its resources. Foucault’s work on governmentality begins with a focus on this literature on political economy, which he sees as marking a break in the Western tradition of rule. Whereas previously the ruler was supposed to rule using common values like prudence, foresight, make the best use of advisors, etc., the work of Machiavelli and his successors transformed rule into an entire set of techniques and a new rationality ([Dean 2010](#)). This new rationality and the techniques arising out of the thought of this period which separated the “reason of state” from the “reason” of the sovereign⁶ was given the name governmentality and can be described as either the rationality of government or “the conduct of conduct”.

2.4.3 *Knowledge, Government and the Subject*

It can be seen that using Uexküll’s ecological notion of the Umwelt and combining it with a Foucauldian understanding of political economy generate a very useful framework for analysis. Both these understandings when seen in an anatomical metaphor offer an interesting description of the state’s relation with the environment. In this the purpose or rationality of the state lies in identifying resources,

⁶[Foucault \(2006, pp. 19–37\)](#) offers a fascinating discussion of this separation using the example of the madness of King George III.

possibilities using specially trained observers in the form of experts. Thus, these experts mediate the relation of the state, and thereby its citizens, with their environment. However, this environment is not a real, neutral and fixed space; it is instead an *Umwelt*. Thomas Sebeok, developing the work of Uexküll, described the way in which language and meaning mediate human relations with the environment, calling it a “semiotic web”, using it to mean

our understanding of our world being not just instinctive, or made up, but an intriguing mix, a spider-like web partially of our own social and personal construction, whose strands, like those of a spider, while they may be invisible, can have real-world effects. (cf. [Sagan 2010](#), p. 4)

Experts occupy a special position in giving shape to the “spider web of meaning” through which the environment is interpreted. The subjective universe of the state is produced through the use of experts, who also subsequently guide its actions. A simplified view of this as proposed in Fig. 2.1 means that the expert observer identifies and gives meaning to the state’s view of what the flowing water is, namely, “waste”. This vision is then translated via governmental rationality into a decision to “use” this water. The *Umwelt* of the state and the individual are mediated in completely distinct ways and correspondingly display completely different actions. The “knowledge” of the expert lies in their ability to observe and give meaning to the environment, which further gives credibility to their statements. As discussed, whereas knowledge mediates all human interactions with the environment, giving it the subjective meaning of the *Umwelt*, it is *expert* knowledge that mediates the *state*’s relation with its environment and offers a useful way of examining the reality of river control.

In a discussion of his work, [Foucault \(1982, pp. 777–778\)](#) countered the impression that it was primarily about power and stated that his objective has instead been “to create a history of the different modes by which, in our culture, human beings are made subjects”. He goes on to classify the ways in which human beings are turned into subjects into three related “modes of objectification”. The first relates to the concept of power/knowledge and is about the “modes of inquiry that give themselves the status of sciences”. This relates to how different forms of knowledge make humans the object of knowledge, for instance, the way in which economics objectifies a human subject who is productive and in relations of exchange; evolutionary biologists would objectify the human subject as a transmitter of genetic information and so on.

However, Foucault countered any simplistic understanding of his work as being about consolidating power and knowledge into one:

... when I read – and I know it was being attributed to me – the thesis ‘Knowledge is power’ or ‘Power is knowledge,’ I begin to laugh, since studying their *relation* is precisely my problem. If they were identical, I would not have to study them and I would be spared a lot of fatigue as a result. The very fact that I pose the question of their relation proves clearly that I do not *identify* them. ([Foucault 1999](#), p. 455, emphasis in original)

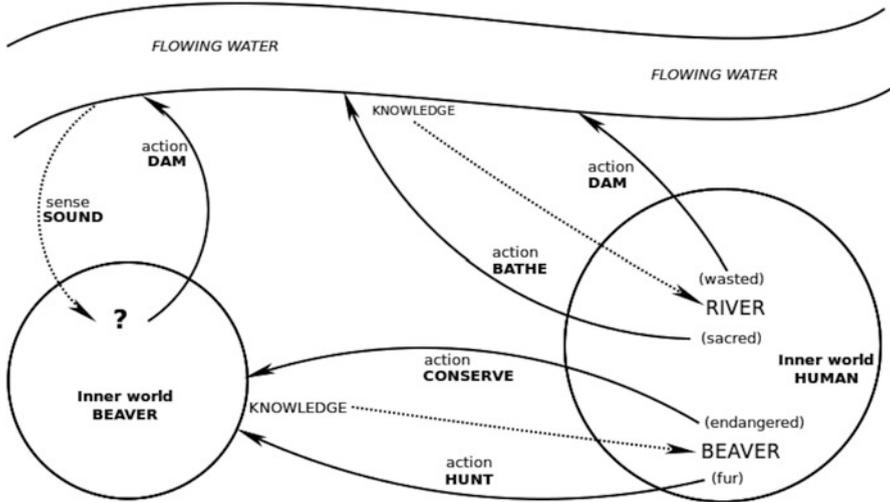


Fig. 2.1 Umwelt, the subjective world of a species. This figure offers a simplified view of the ways in which beavers (*Castor canadensis*) and humans relate to each other and flowing water. Both species dam flowing water, but human responses are additionally mediated by different meanings given to the flowing water. A body of flowing water given the meaning of a sacred river that might be used to bathe, the same body of water considered to flowing waste, may end up being dammed for human use. Human relations with beavers themselves offer an interesting illustration of changing Umwelt based on changing meanings. After being hunted to near extinction for their fur, a change in fashion made their fur valueless as a commodity. Subsequently, with a changing meaning of endangered species given to them, and conservation, the beaver population rebounded. Ironically enough, this has now given rise to the environmental problem of beaver dams altering local habitats and potentially endangering other species (Martell et al. 2006; Naiman et al. 1988)

In other words, the correct metaphor for power/knowledge is not that of Siamese twins, but that of dancing partners; they are both central enough that the one cannot ignore the other, but it does not degenerate into a complete unification.

The second mode relates to the objectifying of the human subject through what Foucault calls “dividing practices”, which divide the subject either within himself or from others. Examples of this would be the ways in which people may be divided into criminal or law abiding, sane or insane, or as is often the case in river control into “project affected” or “beneficiaries”. The third mode, which was his focus during his last years, related to ways in which the “human being turns himself into a subject”. In this Foucault focused on sexuality, or how humans came to see themselves as subjects of “sexuality”. This mode would in this work relate to, for example, how human beings come to see themselves as engineers, as planners, as activists and as “experts”.

Thus, this framework can be seen as connecting several elements of the present research question. First is the specialised observer in the form of the expert, as an actor who is a bearer of power/ knowledge, which can be summed up as expert discourse. Expert discourse here does not mean simply what the experts say, but it

is the limits upon the sort of language they can use to interpret and communicate the functioning of the river. A short summing up of the most critical statement that is at the centre of expert discourse on river control would be, for example, “a river is water flowing waste to the sea”. This is an example of what can be said by the expert to be true, as well as a display of the power of such a statement, in that such a statement has credibility, the right to be taken seriously.

The second element that this framework connects is that of political economy. This, as used by Foucault, implies a technology and rationality of rule, one that is directed at making the territory and population of a state productive. This rationality is what is necessary to produce statements like “the country urgently needs dams to harness the terrible waste of water entering the sea”. These statements proceed from the observations of experts, but they are a necessary step in river control. The statements of experts have to fit within a rationality of rule, perhaps one in which resources must not be wasted; otherwise, the expert statements may just be ignored.

The third element connected by this framework is that of the subject. The expert is not an automaton, but can reflect upon his statements and evaluate them. If the expert begins to doubt his own statements, then it upsets the entire project of river control, as the rationale begins to look shaky.

Therefore, this interconnected framework paying attention to a nonessential human environment, connected by relations of knowledge and power to human actions and mediated by humans as subjects, is used to explore the role of expert discourse on river control.

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