Evolving Water Governance Systems: the case of the Sesan River in South-East Asia and the use of Actor-Network Theory as an analytical tool

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Abstract

Water governance systems comprise aspects of both the natural and social spheres and to be successful need to combine elements of both. While this is now commonly accepted, attempts to improve water governance and policy have often been hindered by the lack of suitable theoretical frameworks that can achieve this. Actor Network Theory (ANT) focuses on the relationships between the human and non-human (Latour 1999; Latour 1999), and may provide us with a way to include material entities such as dams, water pollution, wells etc into analyses of societal water governance networks and institutions. While ANT is not a unitary theory it provides us with insights into how many of the problems faced by water governance are the result of our inability to perceive the complex interactions between human and non-human entities (Latour 1993) and to the dichotomy of human (policy, participation, socio-economic forces etc) and non-human (rivers, lakes etc) aspects. By looking at the relationships between these, and by accepting that non-human entities can perform as actors (Callon, Law et al. 1986) and must be included into analyses of water governance and its institutions, we may be able to avoid the twin traps of positivism or social constructivism (Latour 1999). ANT also addresses the major issue of scale and global/local causes and impacts of water management and calls for a focus on the interrelationships of the two (Latour 1993). While much work has been conducted in science studies, by geographers and in business studies, to date relatively little academic work in water management has directly utilized ANT, although the theory has established itself as a means to study 'nature' per se (Demeritt 2002). In this paper I provide a short overview of ANT and then examine the potential of the theory for water governance at different spatial levels through a description of how ANT is being used in the analyses of water governance in South-East Asia. More precisely, in an examination of the Sesan River that flows between Vietnam and Cambodia and of the role of the hydro-electric power stations and dams on that river.

Background: the Sesan River

The Sesan River flows between Vietnam and Cambodia and is one of the largest tributaries of the Mekong River with a drainage area of 17,000 km, (11,000 km in Vietnam and 6,100 km in Cambodia). It originates in the Central Highlands of Vietnam and the southernmost part of Laos, and flows through mountainous areas in Vietnam's Dak Lak, Gia Lai and Kon Tum Provinces before entering Northeast Cambodia, where it moves into relatively lowland areas. In Cambodia, the Sesan winds from east to west through Ratanakiri Province and into Stung Treng Province, where it merges with the Srepok River, another large tributary of the Mekong and then flows east into the Se Kong River just before this river entering the Mekong River close to the Stung Treng Town. Traditionally people in the region have relied on subsistence agriculture and fishing, developing techniques suited for small-scale water utilization. Increases in population and modernisation have created a demand for more intensive utilization of the water resources, such as large-scale hydropower production, large-scale irrigation and increased water supply for urban populations. While small-scale hydro-electric power production is often managed locally, it is the central authorities that drive large scale water projects. Both forms can create problems, but it is often the large-scale production that has created unforeseen negative impacts for local communities which are still embedded in an older subsistence oriented system. The intensified use of water for power production is also at odds with the needs of agricultural irrigation (Rieu-Clarke, Gooch et al. 2006).

In both Vietnam and Cambodia, authorities exist at the national, provincial, and district levels. The organisation of these authorities differs however considerably. In Vietnam water management is based upon a socialist administration system with a strong central-state role. In Cambodia the state is much weaker and international and national NGO's play a major role. Due to the large number of research institutions and multilateral and bilateral aid programmes working on the Great Mekong Sub-Region (GMS), the Sesan has a multitude of actors, both national and international. The authorities responsible for the management of the Sesan also interact in the context of their work with the Mekong River Commission, a co-operative forum for both the utilization and protection of the Mekong River and its tributaries. Finally, an *ad hoc* Sesan River Committee has been established, but no permanent basin commission has yet been established.

The problem facing the governance of the Sesan River is therefore multi-level (national, regional and local authorities are involved), transboundary (the river flows between Vietnam and Cambodia), it involves multiple actors (governmental agencies, NGO's, ethnic minorities etc), competition between different water demands (energy production, irrigation, fishing etc), and it includes complicated technological systems (hydro-electric power production, large dams, energy supply to domestic and industrial consumers). The issue at stake is moreover not simply to *describe* the nature of the problem and the governance system, but also to attempt to *identify* possible solutions to some of the problems facing water governance in the region.

Water Governance in the Sesan River

The main contemporary problem with the Sesan River is that it is heavily modified; there are numerous dams built along the water course on the Vietnamese side of the border and more are planned or proposed (Vietnam Electricity 2007). Therefore, while any analysis of water governance in the region must involve mapping socio-economic conditions, analysing formal decision-making structures, and gathering data on ecological conditions, these are necessary but not sufficient. In an excellent report from the Stockholm Environment Institute in 2002, it was stated that

'the decision-making process for hydropower site selection in the Se San Basin is a *complex interplay among a range of actors*, exercising their formal mandates but also promoting their own interests, legitimate or otherwise. The actors include national governments (ministries of planning and investment, water resources ministries, ministries of industry etc.); public utilities (Electricity of Vietnam, Electricity Du Lao); the Asian Development Bank; bilateral donors (Sida, Norad, JICA); consultancy and construction companies (SWECO, Halcrow, Norplan, Statkraft); international investors (Nordic Hydropower, owned partly by Statkraft); and equipment suppliers (Öjendal, Mathur et al. 2002).

However, while a large number of traditional, socio-economic actors have been analysed in this and other reports, the role of non-human actants has not yet been sufficiently addressed. The starting point for this study will therefore be the dams themselves; these are at the centre of interest, as it is the dams that have changed environmental flows in a large region and that have resulted in radically different patterns of water supply in the river basin. The demand for energy from the hydro-electric power plants supplied by the dams has also increased and led to a conflict of use between traditional irrigation needs and the needs of electricity for industries and further development in Vietnam, and problems with erratic river flow in Cambodia. In order to understand these changes we need to look at conditions and actors in a broad sense; not only the farmers and industries directly affected by these changes, but also at the global forces that encourage and influence the changes taking place. Using the Actor Network Theory (ANT) approach described in more detail below, we can see that the dams represent more than just concrete structures used to hold back water and generate electricity. They are at the centre of networks that stretch far beyond their geographical vicinities, from the local to the global level, and they influence human activities and behaviour. The dams are the result of international know-how and foreign funding combined with national and local knowledge and demands, and as such they span spatial levels on knowledge from the local to the international. Here we can speak of multi-level networks of know-how, with governments, banks, international organisations, and engineering companies etc constituting different actors. The effects of the dams are also geographically widespread. First there is of course the direct effect of the changes in water regime resulting from changes in water flow. These changes are both quantitative (less water is released for irrigation) and temporal (water is released according to energy needs, not according to the seasons). The changes in water flow also affect agricultural practices and ecological conditions further down the river. However, these changes, which affect the inhabitants of the border region in Cambodia and in other parts of the country, lead not only to changes in natural conditions, but also to changes in forms of livelihood. In response to these changes, international NGO's have become involved, especially in Cambodia, where these organisations work for what they perceive as the good of the local and regional populations. The dams, which in themselves are physical structures, are thus also actors (see below) as their existence results in a wide flora of human, non-human and ecological activity at various spatial levels. I will now go on to describe the ANT approach, and how it is being used in the case of the Sesan River. While the use of ANT analysis in water governance is still in its initial stages, this paper will, I hope, help to demonstrate that ANT can provide a contribution to the study of water and environmental governance at all levels from the local to the global, and as such it can also help us to

understand the interaction of human and non-human actors in water governance. In 1995 The Commission on Global Governance stated that

"Governance is the sum of the many ways individuals and institutions, public and private, manage their common affairs. It is a continuing process through which conflicting or diverse interests may be accommodated and co-operative action may be taken. It includes formal institutions and regimes empowered to enforce compliance, as well as informal arrangements that people and institutions either have agreed to or perceive to be in their interest" (Governance 1995).

ANT includes even more, not only individuals and institutions, public and private, formal institutions and regimes, but also the infrastructure and artefacts that these regimes are built around. ANT challenges the distinctions between local and global, and for ANT, 'there is, therefore, no difference in kind between 'macro' and 'micro' or 'global' and 'local' actors; longer networks can simply reach further than shorter networks' (Murdoch 1997). As these networks can consist of actors and actants at many different spatial levels (Latour 1987), the distinctions between 'local' and 'global' are seen as irrelevant. This leads us to understand that it is of vital importance to follow the network wherever it leads (Latour 1993) and to include all levels within the analysis. In the following sections I will describe the main aspects of ANT that I consider relevant for water governance, and provide examples of how the actor-network around the hydro-electric power (HEP) stations and dams on the Sesan River can be traced.

Actor-Network Theory (ANT) and the Sesan River Dams

Despite constructivist and relativist inroads into the social sciences in the 1990's 'things', non-humans, material objects, rivers, machines, animals, technologies and environmental pollution (not just perceived) *are* important. Constructivism is being challenged by *post-constructivism* (Asdal 2005) and fundamental distinctions between natural and social sciences, people and animals, are being questioned. Actor Network Theory has generated considerable interest in science studies, geography, organisation studies and to a certain extent, environmental studies as a possible means of integrating the 'natural' and the 'social' into the same analytical framework. The potential advantages of this communion of theoretical approaches for water governance can at the present time be seen more as a promise than a fact, but ANT does seem to provide a way to integrate the approaches of the 'natural' and 'social' sciences. Let us begin by looking at one of the central tenets of ANT, that of 'g*eneral symmetry and symmetrical analysis*'. This refers to the necessity for non-human elements (of a network) to be treated analytically in the same way as the social and human elements (Law 1992). This concept of general symmetry is one of the most heavily criticized aspects of ANT (Vandenberghe 2002; McLean and Hassard 2004) and of course it cannot be denied that human actors perceive and act upon their world in ways that non-humans cannot (Bruun and Langlais 2003). However, it is also true that a mixture of human and non-human actors is precisely what we have to deal with in water management (Gooch 2004). This of course raises a difficult question; can hydro-electric power stations, desalination plants, irrigation canals and waste water treatment plants be considered political phenomena in their own right? (Pels, Hetherington et al. 2002) and can there be a 'politics of things' (Winner 1986)? These questions cannot be answered a priori, we need instead to keep an open mind about the roles of different actors, and to be prepared to accept that dams and statistics can play major roles, just as governments and environmental administrators can. Let us return to the case at hand, that of the Sesan River, and start by looking for the cause of the changes in water regimes. As we are concerned with a transboundary river we should of course look at the actors and influences on both sides of the Vietnam-Cambodian border. However, here we will only analyse the Vietnamese network in order to present the theory without all too many complications.

One of the central ideas of ANT is that we should not only look at human aspects of water management, but that also non-human entities such as material objects, organisations and technology must be taken into account, either as actors or in other roles. As a result both humans and non-humans are sometimes referred to as '*actants'*. In this way ANT differs from most other forms of constructivist network analysis, and can perhaps be best described as *post-constructivist* (Asdal 2005). One of the leading figures of the approach is the French scholar Bruno Latour who has written extensively about what he considers an artificial dichotomy between nature and society, and of the necessity of reunion of these two (Latour 1999; Latour 2004). In this respect there are similarities with Foucault's (Foucault 1980) discussion of the artificial division of space into 'nature' and

'culture' or 'state'. As the concept of *actant* is, as noted controversial, we can begin by tracing the causes of the changes to water flow and river regimes that have occurred on the Sesan. Starting from the changes in river flow, the most obvious cause of the problems experienced by the down-stream, Cambodian actors, it becomes clear that the dams constructed to provide much-needed energy for the growing population and industrial development of Vietnam are at the centre of the controversy.

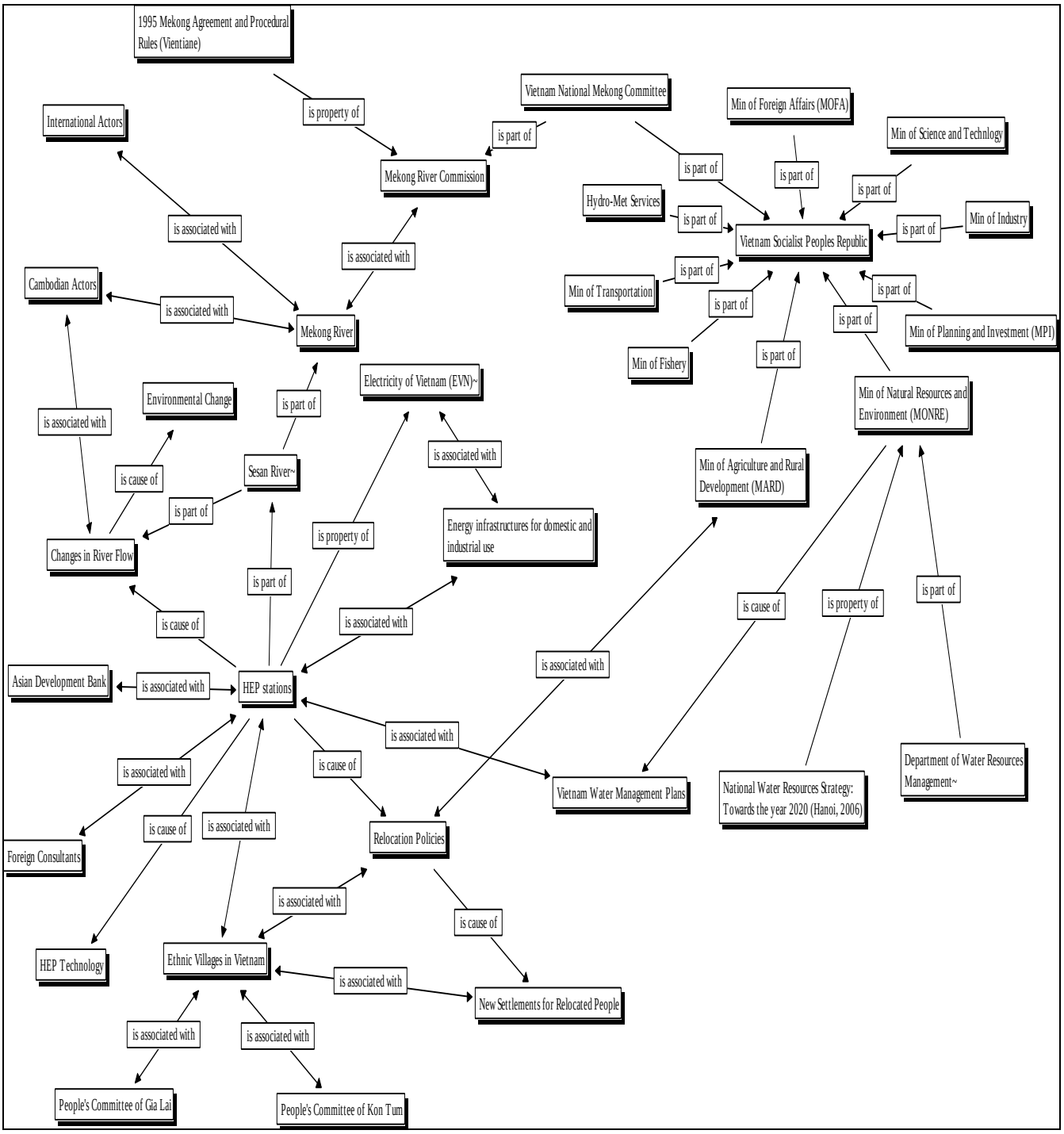

Figure 1: The Hydro-Electric Dam Networks on the Sesan River, South-East Asia

The largest and most important, both from the perspective of Vietnam and Cambodia, is the Yali Dam. Construction of the dam began in 1993 and was completed in 1999 ((CRES) and University 2001). The project has four turbines is constructed to produce 720 MW of electricity, far more than the other existing or projected dams on the Sesan such as Se San 3 (273 MW), Se San 4 (330 MW), Pleikrông (100 MW), Thurong Kon Tum (220 MW) and Se San 3A (108 MW) (Vietnam). As can be seen in Figure 1, the HEP dams are part of a network consisting of governmental agencies, ethnic villages, river flow, and relocation policies etc. While it is itself the result of energy demands from a growing and developing population, its effects on both humans and non-humans, in Vietnam and Cambodia, is considerable. Also, as a major tributary to the Mekong, it also influences water flows in that river; however, precisely because it is a tributary, it does not come under the Mekong River Agreement. We can also see from the network diagram in Figure 1 that the dams, together with various departments and ministries of the People's Republic of Vietnam, are important nodes in the network. The dams can therefore be seen as actants in the network, and as a source of power in both a material sense (power as in energy) and in a political sense (power as in ability to influence others). The concept of power is at the centre of ANT, for as Law notes, 'actor-network theory is all about power -- power as a (concealed or misrepresented) effect, rather than power as a set of causes' (Law 1992) and actors (or actants) gain power through their relations with others in networks, for 'ANT seeks to analyse how social ***and*** material processes (subjects, objects and relations) become seamlessly entwined within complex sets of association' (Murdoch 1998). As can be seen in Figure 1 a network can stretch far beyond what may appear to be the centres of activities (Latour 1987); the HEP dams are connected both to energy consumption and to resettlement villages in the Central Highlands. They are also connected to water flow in the Mekong River.

It should be noted that the network in Figure 1 is not yet complete; it is part of an on-going analysis and more actants will undoubtedly be included at a later stage, both within Vietnam, in Cambodia of course, and also at other levels. It is important to follow the network wherever it leads (Latour 1993), and distinctions between the local and global are rarely relevant. The need for energy for industrial production is a defining factor of Vietnam's industrialisation and entrance into world markets; changes in river flow and the relocation of minority people's are therefore connected with the production of, for example, training shoes for the Western market. The influences of the dam are both social and physical, and these cannot be separated (Callon, Law et al. 1986).

Actors/actants/ and entities are major elements of the actor-network, and have been described as 'any element which bends space around itself, makes other elements dependent upon itself and translates their will into a language of its own' (Callon and Latour 1981). Actors do not, however, hold power by themselves, they only do so through their relations with others (Foucault 1980; Latour 1987). Actors can be seen as nodes in a network (or networks) and actors as an 'entity that interacts with other actors or serves as an intermediary between actors (Combera, Fishera et al. 2003). In the case of the HEP dam network it can be seen that there are a number of nodes, among them the Government of Vietnam and the dam itself (see Figure 1). ANT claims that the form and attributes that actors have are dependent on their relations with other entities (Law and Hassard 1999) and that actors and entities can be either human or non-human; the properties of entities (human and non-human) will also be dependent on their relationships in a network (Healy 2004). As the term 'actor' is usually associated with human actions the term 'actant' is sometimes used to signify non-human influences, and here the dam will be called an actant, not actor. In order to map the network, Latour has suggested that we should simply 'follow the actors' (Latour 1993) and keep an open mind as to which entities exist and to their importance and role in the network. In practice, this involves looking at the relationships that the dam has, with humans and with non-human entities. Figure 1 demonstrates that there are many such relationships in the dam network. Here we can see that the network also consists of both social structures and associations with other non-human entities. Latour (Latour 1996) claims that social structures are in themselves not solid enough to frame durable interactions and hold social reality in place. Human sociality must be combined with nonhuman entities. The HEP network is composed of different categories of people, bureaucrats, scientists, politicians, NGO's in Cambodia, and civil society. We could also include engineers, businessmen and women, and financial institutions. The network also includes statistics, documents, reports, and infrastructures for the transportation of energy, the organizational structures of the international organizations involved as well as the fish, aquatic animals and crustaceans in the Sesan River.

Let us move on to the question of how networks are formed? ANT claims that this occurs through *translation*, which is 'all the negotiations, intrigues, calculations, acts of persuasion and violence, thanks to which an actor or force takes, or causes to be conferred on itself, authority to speak or act on behalf of another actor or force' (Callon and Latour 1981). Translation is seen as an on-going struggle over power, and through translation an actor persuades others to accept his/her/its view of the world, and becomes the main representative of this view, able to speak for the network and to define its goals. Looking at the HEP dam network it becomes apparent that as yet there is no completed process of translation. The Vietnamese authorities state that there were initial problems with erratic water flows during the building process of the Yali Dam and first period that the dam was active, but that these problems have now been solved (personal communication, EVN, Hanoi), while an alternative translation is provided by Cambodian authorities and international NGO's. For example, a report by The Fisheries Office, Ratanakiri Province, Cambodia, states that 'approximately 20,000 people in 3,500 families in Ratanakiri Province have experienced serious ecological and socio-economic impacts as a result of the over US$ 1 billion Yali Falls dam' (The Fisheries Office and The Non-Timber Forest Products (NTFP) Project 2000). A report by the 3S Rivers Protection Network claims that '722 households composed of 3,545 people (including 1,800 women, from 17 villages and 8 communes located along the river's four districts) have abandoned the Sesan River in order to live in upland mountainous areas', and that 'The main reason why many communities have chosen to abandon their homes and a village located along the Sesan River is due to the river's frequent flooding' ((3SPN) 2007). The cause of the problems is said to be the dams on the Sesan, and the report also states that '(T)he future of the dam-impacted people remains a great concern, because thus far there has yet to be an effective mechanism or solution practiced in resolving the negative impacts caused by the dams' ((3SPN) 2007). A report by Center for Natural Resources and Environmental Studies (CRES) Vietnam National University ((CRES) and University 2001) also points out that the Yali Dam has created problems for local ethnic peoples in Vietnam, and that the resettlement policies have not always been a total success. The Vietnamese authorities see with suspicion on the Cambodian NGO reports, while the NGO's themselves have little trust in the Vietnamese claims of relatively small negative effects of the dam.

Can then ANT provide water governance with a useful tool for analyses? The ways that ANT have guided the analyses of the Sesan River, taking as a starting point the HEP dams, seems to indicate that the answer to this question is a qualified 'yes'. The approach of considering both human and non-human entities in the network seems sound. Yet the positioning of the dams as actants is controversial, especially from the perspective of symmetry, as 'from a methodological view, the challenge facing ANT researchers is to produce accounts that are sophisticated yet robust enough to negate the twin charges of symmetrical absence or symmetrical absurdity.'(McLean and Hassard 2004).

ANT in Water Governance – the way ahead?

There is as yet, with some exceptions (Swyngedouw 1999; Burgess, Clark et al. 2000; Campbell 2005) a limited amount of work that uses an ANT perspective on the issue of water governance. While an integrated approach to water management has now become conventional wisdom, there are few studies that successfully combine the human and non-human aspects of the issue. This may seem surprising but on the other hand 'everything has been studied by social scientists everything, that is, except laboratories, executive rooms, computers, engineers and weapon systems' (Latour 1991; Asdal 2005). So what exactly *do* we social scientists study in water governance? Policy formulation by politicians, public participation and NGO's, the communication between different (human) actors, the laws regulating water, the economics of water use, the 'social construction' (sic) of nature, yes. But we seem to have conducted few studies of the technical processes that are part of the reality for engineers, energy suppliers and construction workers. We also seem to have generally ignored the ways in which infrastructures mould our world and our ability to create successful water governance systems. While ANT cannot be expected to rectify these deficiencies, it may help us to understand better the interaction of human and non-human actants in water governance networks.

References

(3SPN), S. R. P. N. (2007). Abandoned Villages along the Sesan River in Ratanakiri Province, Northeastern Cambodia.
(CRES), C. f. N. R. a. E. S. and V. N. University (2001). Study into impact of Yali Falls Dam on resettled and downstream communities.
Asdal, K. (2005). "Returning the Kingdom to the King: A Post-Constructivist Response to the Critique of Positivism." Acta Sociologica **48**(3): 253-261.
Bruun, H. and R. Langlais (2003). "On the Embodied Nature of Action." Acta Sociologica **46**(1): 31-49.
Burgess, J., J. Clark, et al. (2000). "Knowledges in action: an actor network analysis of a wetland agri-environment scheme." Ecological Economics **35**(35): 119-132.
Callon, M. and B. Latour (1981). Unscrewing the Big Leviathan: How Actors Macro-Structure Reality and How Sociologists Help Them to Do So. Advances in Social Theory and Methodology: Toward an Integration of Micro- and Macro-Sociologies. K. Knorr-Cetina and A. V. Cicourel. London and Henley, UK, Routledge & Kegan Paul**:** 277–303.
Callon, M., J. Law, et al., Eds. (1986). Mapping the Dynamics of Science and Technology. London, Macmillan.
Campbell, M. O. N. (2005). "Actor networking, technological planning and conceptions of space: The dynamics of irrigation farming in the coastal savanna of Ghana." Applied Geography **25**: 367-381.
Combera, A., P. Fishera, et al. (2003). "Actor–network theory: a suitable framework to understand how land cover mapping projects develop?" Land Use Policy **20**: 299–309.
Demeritt, D. (2002). "What is the 'social construction of nature'? A typology and sympathetic critique." Progress in Human Geography **26**(6): 767-790.
Foucault, M. (1980). Power/Knowledge. Harlow, Pearson.
Gooch, G. D. (2004). Transboundary problems not just environmental. World Water and Environmental Engineering.
Governance, C. o. G. (1995). Our Global Neighbourhood: The Report of the Commission on Global Governance. Oxford, Oxford University Press.
Healy, S. (2004). "A 'post-foundational' interpretation of risk: risk as 'performance'." Journal of Risk Research **7**(3): 277-296.
Latour, B. (1987). Science in Action. Milton Keynes, Open University Press.
Latour, B. (1991). "The Impact of Science Studies on Political Philosophy." Science, Technology and Human Values **16**: 3-19.
Latour, B. (1993). We Have Never Been Modern. Hemel Hempstead, Harvester Wheatsheaf.
Latour, B. (1996). "On Interobjectivity." Mind, Culture and Activity **3**(4): 228-245.
Latour, B. (1999). On recalling ANT. Actor Network Theory and After. J. Law and J. Hassard. Oxford, Blackwell Publishers/The Sociological Review.**:** 15-25.
Latour, B. (1999). Pandora's Hope: Essays on the Reality of Science Studies. Cambridge Massachusetts/London, Harvard University Press.
Latour, B. (1999). Politiques de la nature. Comment faire entrer les sciences en démocratie. Paris, Editions la Découverte.
Latour, B. (2004). The Politics of Nature: How to bring the sciences into democracy. Cambrife, Ma., Harvard University Press.
Law, D. and J. Hassard, Eds. (1999). Actor Network Theory and After. Oxford, Blackwell.
Law, J. (1992). "Notes on the Theory of the Actor Network: Ordering, Strategy and Heterogeneity." Systems Practice. **5**: 379-393.
McLean, C. and J. Hassard (2004). "Symmetrical Absence/Symmetrical Absurdity: Critical Notes on the Production of Actor-Network Accounts." Journal of Management Studies **41**(3): 493-519.
Murdoch, J. (1997). "Towards a geography of heterogeneous associations." Progress in Human Geography **21**: 321–337.
Murdoch, J. (1998). "The Spaces of Actor-Network Theory." Geoforum **29**(4): 357-374.
Öjendal, J., V. Mathur, et al. (2002). Environmental Governance in the Mekong: Hydropower Site Selection Processes in the
Se San and Sre Pok Basins. Stockholm, Stockhom Environment Institute.
Pels, D., K. Hetherington, et al. (2002). "The Status of the Object: Performances, Mediations, and Techniques." Theory, Culture & Society **19**(5/6): 1-21.

Rieu-Clarke, A., G. Gooch, et al. (2006). Report from the 1st Se San Stakeholder Workshop. Thursday, 14th December 2006, Pleiku, Vietnam.

Swyngedouw, E. (1999). "Modernity and Hybridity: Nature, Regeneracionismo, and the Production of the Spanish Waterscape, 1890–1930." Annals of the Association of American Geographers **89**(3): 443-465.

The Fisheries Office, R. P. and R. P. The Non-Timber Forest Products (NTFP) Project (2000). A Study of the Downstream Impacts of the Yali Falls Dam in the Se San River Basin in Ratanakiri Province, Northeast Cambodia.

Vandenberghe, F. (2002). "Reconstructing Humants: A Humanist Critique of Actant-Network Theory." Theory, Culture & Society **19**(5/6): 51-67.

Vietnam Electricity, P. (2007). Hanoi.

Vietnam, E. o.

Winner, L. (1986). Do Artifacts Have Politics?' The Whale and the Reactor. L. Winner. Chicago, University of Chicago Press**:** 26-38.