

Questioning Masculinities in Water

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Beginning with colonial times and continuing to the present, irrigation has been an important site for the construction of gendered power and hegemonic masculinities. The strong connection between masculinities and irrigation cultures may provide an important explanation of why hydraulic bureaucracies are so resistant to change. The continued masculinity of irrigation requires critical investigation of masculinities, technology and organisations. Such studies will serve both as a first step to creating more space for women engineers in government water agencies, and contribute to unravelling important aspects of the cultural politics of water.

Mentioning “women” (or gender) in a professional irrigation context is much less of an anomaly than it used to be some 15 to 20 years ago. Numerous texts have been published about gender and water, and a large number of studies have been conducted (see Ahmed 2005; Coles and Wallace 2005; Bennett et al 2005; Lahiri-Dutt 2006). Most water policy documents likewise mention women, and most donor-funded irrigation projects have gender components. Often at the initiative of (some would say under pressure of) donors, public irrigation departments and ministries in some countries (including, for instance, Bangladesh and Nepal) have developed (or are developing) specific policies on gender. Gender has also become an important feature in water campaigning in recent years, with women figuring prominently in anti-dam and anti-privatisation movements across the globe. International networking around gender and water likewise gained momentum, with, for instance, the Women for Water Partnership and the Gender and Water Alliance.

Irrigation Still a ‘Man’s World’

In spite of (or maybe thanks to) the fact that gender and women have now earned a legitimate place on water research and policy agendas, the irrigation world continues to be a “man’s world”. This manifests itself along at least three different dimensions, which are linked although not in direct causal ways. The first is the rights to irrigation water and infrastructure (rights to irrigated land and rights to participate in irrigation decision-making, almost everywhere in the world, are predominantly vested in men). Female irrigators and farmers have significantly fewer possibilities to own irrigated land and water than male irrigators and farmers do. Although women often are important providers of labour to irrigated agriculture and to canal maintenance and cleaning, they often do not themselves directly control the fruits of their work and this work is also typically valued and rewarded less than men’s irrigation work. Membership of irrigators’ associations likewise tends to be reserved for men, with participation in public meetings often seen as an activity that belongs to the domain of men. As a result, women often do not have a formal voice in decision-making and do not have the same possibilities for influencing choices about the mobilisation of resources for maintenance or about water distribution as men do.

The second dimension of the masculinity of irrigation is that the professional irrigation domain is heavily male-dominated. This is most obvious in the fact that most irrigation professionals (experts, engineers, managers, planners and policymakers) are men. However, and maybe less directly obvious, it also shows in the fact that the professional involvement with irrigation, be it as an engineer, manager or planner, is very much identified and

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perceived as a male activity, or as an activity belonging to the domain of men. Lynch (1993), as one of the few to reflect on the genderedness of the irrigation profession, argued that the characteristics and culture of the “bureaucratic tradition” to which irrigation institutions and policies are tied is one that strongly associates decision-making and power with masculinity. As she argues, the hegemonic strength of this tradition has long been maintained, and to some extent continues to be maintained, through the socialisation of generations of engineers and bureaucrats. It finds legitimisation in the powers and financial resources of irrigation bureaucracies (or *hydrocracies*, Molle et al 2009). Through the “bureaucratic tradition”, masculinity and the professional irrigation identity have come to belong to each other; they mutually constitute and define each other at symbolic and metaphorical levels.

The third dimension in which irrigation is a man's world, is that irrigation narratives and knowledges have long devaloured women's contributions or rendered thinking and speaking about women irrelevant. Most contemporary irrigation texts are no longer overtly sexist, for instance in preaching in favour of a gender specific division of labour based on a naturalisation of gender differences or by automatically connecting women with the bodily work of reproduction and domestic labour. Yet, most current discursive interpretations of irrigation realities do typically emphasise and attach greater value to those activities and experiences that are associated with men. More in general, there exists a particular epistemic tradition in knowing irrigation that is deeply inhospitable to the analysis of social relations and gender (Zwarteveen 2010).

Most studies and writings on gender and water to date have focused on the first dimension. The normal tendency of gender-and-water studies is, in other words, to “study down” – document gendered patterns of water work and gendered divisions of rights and responsibilities as a first step to recognising and establishing women's importance as water-actors, and gaining legitimacy for their demands for water rights and powers. Such studies focused on understanding “what happens in the field”, and have greatly contributed to making women visible and showing the genderedness of local water realities. However, the project of making women visible seemed based on the assumption that men are visible and well represented. I use this article to question this assumption. The people mostly referred to in irrigation texts and policies are men. Yet, this is seldom made explicit. The fact that they are men is simply assumed, or is implied not to matter for their irrigation behaviour, because that behaviour is derived from some universal human nature that is either gender-neutral, pre-gendered (human) or the norm. The same is true of the fact that most producers of irrigation texts are men, and for the related fact that most water expertise and authority is attached to men. Most of the water managers and engineers and water-management organisations and irrigation agencies in most countries is vested in men. This is something that has been noted and lamented; it underlies calls for more women in water decision-making, engineering education and professions. Yet, the conditions, processes and consequences of men's historical and contemporary domination of the irrigation profession have received

little scrutiny (Collinson and Hearn 1996: 3). How and why do water control, status and expertise become linked to men (and masculinity)? How do such links work to legitimise the exercise of power? These are questions that are seldom asked, a silence that reflects that the association, or even conflation, of men with organisational power, authority, expertise and prestige in water is taken for granted and is self-evident (*ibid*).

Focusing on Male Water Engineers

In this article, I therefore propose a reversal of the research gaze, from female water users to male water engineers. I argue that it is high time to also start analysing the other two dimensions of the masculinity in the water sector, and that the critical study of the linkages between water control (powers and politics) and men/masculinities constitutes an urgent and interesting project both of feminist water studies and of studies that try to understand the cultural politics of water. This argument is based on the strong suspicion that the (discursive and real) invisibility of men and masculinity in irrigation has important political dimensions in the sense that it is one of the ways in which power presents itself as self-evident and “natural”. In other words, I hypothesise that the masculinity of irrigation helps establishing a Foucaultian type of power, the source and workings of which themselves remain hidden, in analogy with the watcher in the Panopticon prison whose controlling techniques importantly depended on his own invisibility (Boelens 2008). Indeed, the mistake made by many gender and water studies is that they equalled men's centrality with their visibility. Yet, being at the centre is not the same as being visible: being at the centre can serve to hide, obfuscate, confuse, and obscure (Whitehead 2002).

Suggestions for directing the research gaze towards those who hold power and expertise in water is in itself not new. Chambers already proposed it in 1988 (Chambers 1988). More recently, the observation that “critical perspectives in water studies have tended to take the water users' side, and concentrate on the study of localised water management practices and resistance to projects of state bureaucracies” (Molle et al 2009: 244) provoked a similar plea. So far, however, little work has been done on hydrocracies and engineers, and even less of such work has looked at masculinity as a crucial element in it (Laurie 2005 is one exception). Studying masculinities in a professional water context does not mean only focusing on men, but implies examining the institutions, cultures and practices that sustain (gender) inequality (within and between genders) along with other forms of domination such as race and class. It involves questioning symbolic as well as material dimensions of power, and means working on, and recognising the connections between, the personal and the professional, the politics of institutions and the global system (White 1997: 22).

In what follows, I first discuss some theoretical notions useful for studying the linkages between men, masculinities and water powers. I continue by suggesting and discussing two potentially interesting areas for “masculinities and water” research: a feminist history of hydrocracies and feminist ethnographies of current hydrocracies (or feminist studies of engineering as a profession).¹ Both provide promising entry points for beginning

to unravel how engineering and engineering organisations have been constructed, and continue to be constructed as, masculine. I focus my arguments on, and illustrate them with examples from, south Asia.

Masculinities

Gender is the set of social relations through which the categories male and female, masculine and feminine, derive meaning and shape experience. These categories are situated within and grow from specific social, political and historical conditions and intersect with all other social relations, including class, race, ethnicity, nationality, religion, age and sexual preference. My plea for studying men/masculinities in irrigation builds on growing concerns in wider feminist theory with gender identity and with masculinity (Connell 1995; Collinson and Hearn 1996; Haywood et al 2003; Cleaver 2002; Whitehead 2002).

Much of this work focuses on the experience of men in northern industrialised countries (Cleaver 2002: 1), and much of it is either inspired by demands of gay or transgender men for their (specific) masculinities to be conceptually and politically recognised, or by men's movements which in different ways aim to contribute to thinking about the changing meanings of manhood in a (post-)feminist (or some would say "feminised") world. Some of these studies address men as "a problem" that needs to be solved, for instance in associating men with (sexual) violence (for a south Asian example, see Roy 2001). Others set out to propose means and strategies for involving men in the feminist project, based on the belief that unequal gender orders will only change if men collaborate (see Connell and Messerschmidt 2005 for a useful overview). There also exist a growing number of more populist and often "anti-feminist" writings, many of which depart from the proclamation of a "crisis in masculinity". These either portray men as needing to reject feminism (if they are, that is, to "find their authentic male selves"), or ignore feminist theories altogether in their research on men (Whitehead 2002).

Although some of this work has produced inspiring insights, "masculinity", in particular when used in cross-cultural contexts, remains a somewhat ambiguous, multipurpose term (White 1997), with the study of masculinities often simply referring to the study of men; a lack of theoretical clarity about the linkages between physical bodies and gendered identities; and with often unclear or poorly articulated political and normative assumptions. Is masculinity simply what (most) men (should) do, and to what extent can women be masculine or perform masculine behaviour (Halberstam 2002)? Is masculinity necessarily "bad" (as when associated with violence or patriarchy) or "good" (as when associated with men's true natures and male authenticity)? Instead of asking Butler's question of how (through which regulatory norms) sex is materialised (1999: 10), analyses of masculinity have too often asserted the social construction of gender, while at the same time forcefully and unproblematically assuming and proclaiming the existence of sex differences (Haywood et al 2003). In other words, much thinking remains premised upon the dual oppositions of male and female as existing prior to the analysis, rather than seeing gender differences as socially and historically specific constructions. Also, relatively

little work has been done so far to explore whether similar concepts and theories of masculinities are useful across different cultures and societies. What, for instance, about societies that produce different kinds of genders not confined to a rigid female/male binary? And what are the linkages between more or less global versions of masculinity and more local ones? Masculinity studies, in sum, is an emerging field of inquiry and theorisation. It remains full of critical – though often productive – tensions.

My own approach is to engage masculinities through the prism of feminist theory or to write feminist theory using masculinities as an analytic dimension (Kegan Gardiner 2002). Gendered social orders are rooted in notions of male and female, masculine and feminine. Such notions are often perceived as fixed categories distinguished by a series of putatively natural, hierarchically-ranked oppositions. Although the particular content of the pairs is specific to culture and history, their oppositional hierarchical character is prevalent throughout the world, with men and masculinity, however defined, in a privileged position (Ely and Meyerson 2000: 115). A fundamental premise of my approach is the social constructedness and performativity of gender (Butler 1999 and 2004), which leads to the methodologically and psychologically troubling insight that there is no ahistorical or transcendent truth about gender. What gender "really" is can never be established, for what it means to be a man or a woman is always deeply contextual. In Butler's terms, "man" and "woman" are sites of permanent openness and resignifiability (Butler 2004). Yet, and as Fraser and Nicholson suggest:

The lack of a common content of the social distinction between 'woman' and 'man' does not mean that there are no connections between the diverse meanings of 'woman' and 'man' that do exist. Instead of thinking that either there must be a common meaning (...) across contexts or that there merely exists a disparate assortment of such meanings with no connections; we can instead understand the meaning of the male/female distinction across cultures in another way. We can see it as encompassing a complex web of distinctions evidencing threads of overlap within a field of discontinuities (Fraser and Nicholson 1990: 35).

With Whitehead, I define masculinity as those practices and ways of being that serve to validate the masculine's subject's sense of itself as male/boy/man (Whitehead 2002: 5). The study of masculinities – or perhaps a feminist sociology of masculinity – would require a relational approach that locates gender within broader dimensions of power and social difference, and recognises its symbolic as well as material aspects. Because gender is socially constructed, and because it cuts across other differences (not least class and race), there are numerous femininities and masculinities. Gender operates at the level of structures (i.e., kinship, property, labour divisions), identities and symbols (Harding 1986), which is why there is a distinction between individually practised gender identity and collectively held gender stereotypes or norms. Connell's (1995, Connell and Messerschmidt 2005) notion of "hegemonic masculinity" is one way of capturing this distinction. Hegemonic masculinity "embodies the currently most honoured way of being a man, it requires all other men to position themselves in relation to it, and it ideologically legitimates the subordination of women to men" (ibid: 832). There could be a struggle for hegemony between old and new forms of masculinity (ibid: 832-33). Laurie provides an example

of such a struggle in the context of water, and shows how different understandings of modernity were associated with different masculinities in the Bolivian water wars (Laurie 2005).

A feminist analysis sets out not just to describe and name different manifestations of gender, but also to critically unravel effects in terms of power and the creation of social hierarchies. Yet, the linkages between gender (or masculinities) and power are not straightforward or one-dimensional. How hegemonic masculinity is maintained or challenged is probably best captured by a Foucaultian analysis, in which power is not necessarily possessed or exercised by agents, but is “subject-less”. It functions because of the presence and proliferation of norms (in this case about appropriate male and female behaviour), including both the dominant and subordinated in a normalising web.

To apply these theoretical notions to the study of water and masculinities, I also draw on work done on gendered organisations (Acker 1990; Collinson and Hearn 1996; Meyerson and Fletcher 2000; Ely and Meyerson 2000; Ferguson 1984; Gherardi and Poggio 2001; Yancey Martin and Collinson 2002; Yancey Martin 2003; Wajcman 1998) and on feminist technology studies (Cockburn 1983, 1985; Faulkner 2000, 2001, 2007, 2009; Oldenziel 1999; Wajcman 1991, 2001, 2004, 2010). Important in this scholarship is a conceptualisation of technology and (engineering) organisations as *cultures*, and the idea that gender and technology (or gender and bureaucratic organisations) mutually shape each other. This allows going beyond explaining the numerical dominance of men in irrigation bureaucracies and as water experts just in terms of in/exclusion. The mutual shaping idea importantly implies that neither the meaning(s) of gender nor those of organisations, science or technologies can be taken for granted (or “blackboxed”). Gender is partly configured through existing organisational structures and cultures, and through particular ways of doing science and engineering. And vice versa: the very definition of what constitutes a good bureaucracy or a good engineer (or a good manager, or good science) is itself deeply shaped by prevailing gendered identities, hierarchies and power relations. In other words, engineering and technology are both source and consequence of gender relations (Wajcman 2004), and this mutual shaping happens through both material as well as discursive mechanisms.

‘Making Irrigation Masculine’

The title of this section paraphrases the title of a book by Ruth Oldenziel *Making Technology Masculine* (Oldenziel 1999). The book is a fascinating account of the gendered history of technology in the US, and provides a nice illustration of the mutual shaping of technology and society. In it, Oldenziel indeed shows how technology was *made* masculine (and white, for that matter). Through conscious efforts to positively distinguish themselves and gain status and respect as a professional group, mechanical and civil engineers during the late 19th century in the US succeeded in delimiting the definition of technology as consisting of those activities they engaged in. In doing so, they reduced the significance of existing technologies; the artefacts and forms of knowledge associated with women and black people. This resulted in the rise of engineers as an elite with exclusive rights to

technical expertise. And, crucially, it involved the simultaneous creation of a male professional identity, based on educational qualifications and the promise of managerial positions, sharply distinguished from shop-floor engineering and blue-collar workers. This engineer also became a more general model for a particular version of masculinity, characterised by the cultivation of bodily prowess and individual achievement. This gradual definition of what technology (and engineering) was about also redefined femininities as intrinsically incompatible with engineering and technology (Wajcman 2010; Oldenziel 1999).

It is not difficult to see how a similar analysis could be of interest for understanding the association between irrigation and masculinity as the outcome of a gradual historical process in south Asia. Studies on the (colonial) history of engineering in south Asia suggest how, here also, the very definition of engineering was, at least from the colonial period onwards, based on racial and gender exclusions and hierarchies. This starts with the lack of acknowledgement of the existence of pre-modern irrigation technologies by contemporary engineers. Engineering in India has a long history, with engineers being active from the time of the Mogul rule and later from the Maharattas, who were very skilled at the construction of military engineering projects (Black 2009: 231). A wide range of irrigation techniques were practised by Indian communities: “temporary earth dams, tanks, wells and canals. There were inundation canals in north-western India, step-wells and stone-built underground reservoirs in Rajasthan and Gujarat, and *anicuts* in southern India” (Sharma 2008: 44). The prevailing view until far into the 20th century was that pre-British irrigation systems were “rudimentary or primitive” (Sharma 2008: 52), even though it seems likely that existing engineering insights have shaped and influenced modern engineering wisdom, because of the very little prior knowledge or experience that the first engineers who designed and constructed irrigation works in India had (Black 2008). Also, many of the first irrigation interventions of the British consisted of restoring existing irrigation works, many of which were in disrepair and decay (Sharma 2008).

There is little idea of precolonial or premodern engineering knowledges (Sharma 2008), even though these figure prominently in critiques of “modern” sciences as offering promising alternatives that are more equitable and environmentally sound. Giving a feminist twist to this debate, Shiva, for instance, argued that: “Nature’s work and women’s work in water conservation has usually been ignored by the masculinist paradigm of water management which has replaced community control by privatisation, and water-prudent staple food crops by water thirsty cash crops” (Shiva 1989). Yet unlike what such critical accounts often claim, also premodern knowledges and technologies may have been based on and constituted by prevailing social and gender hierarchies. Shah, in an interesting analysis of the history of tank irrigation based on folktales and songs, for instance suggests that the design and construction of tanks was based on the availability of coerced labour, the expropriation of surplus by elites and forced displacement. She concludes:

Tanks as artefacts were socially embedded in societies and economies that were organised for warfare, sustained sharp social hierarchies, and were often violent to women and people from lower castes.

Clearly, the tank as a socio-technical artefact was integral to the forms of inequality and violence of the pre-modern social order in south India (Shah 2008: 673).

Among the British colonisers in India in the 19th century, there was an overall lack of expertise and knowledge about engineering. This realisation prompted the establishment of the first engineering institute of the British empire in India in 1847, Roorkee College, renamed Thomason college. Its educational system was hierarchical, offering different courses for different "classes" of students: engineers, upper subordinate and lower subordinate. Who could follow which class was clearly specified: the engineers class was only for Europeans, the upper subordinate class was for both Europeans and Indians and the lower subordinate class was only for Indians (Sharma 2008). Hence, initially only Europeans could study here to become engineers. This was partly inspired by fear of (new) movements for independence, and partly based on prejudice about "Indians". Engineers of Indian nationality were seen and defined as less suitable to become engineers, or to assume high positions in the public works department (PWD). At the same time – because of the association with craftsmanship, the higher appreciation of liberal arts in comparison to engineering sciences and the fact that entrance into the profession was based on merits (and examination) rather than lineage (Black 2009) – engineers were at the lower end of the "white" hierarchy.

This, in itself, may partly explain why engineers had an interest in actively constructing an image of themselves as (a particular version of) "real men", as the association with masculinity was a strategy to gain prestige and status. In general, and as historians of Victorian and Edwardian Britain have noted, the colonial power invested much in cults of manliness and masculinity, an investment which articulated in specific ways with British imperialism. One famous study (by Nandy 1983) on the psychology of colonialism, shows a "language of homology between the sexual and the political" in colonial culture, and suggests that the British imperial ideology in India was "hypermasculine" through maintaining a rigid dichotomy between the masculine and the feminine that was part of the gender ideologies of the post-Enlightenment west. The ideals of Victorian manliness, athleticism and militarism featured centrally in studies of British and Anglo-Indian society, especially in accounts of the colonial Indian bureaucracy and the Indian army (Sinha 1999). I have not come across studies that specifically look at engineering and engineers, but it is plausible that the engineering colleges and the PWD have provided important sites for the construction of a specific version of masculinity, one that was perhaps more rowdy, physical and practical than the prevailing entrepreneurial or intellectual "Oxford liberal arts" ones.

Interestingly, the expression and justification of hierarchies between European and Indian men also partly happened through a kind of "manliness scaling", with "Asiatics" being for instance considered less tough (and manly) than "Europeans" and therefore less suited for engineering work (Black 2009: 229-230). The more general "masculinity hierarchy" had the stereotype of the effeminate Bengali man at the lower end, and the white brave European at the higher end. The famous colonialist ethnography

of "martial" and "non-martial" races in India for the purposes of recruiting Indians in the army further suggests the importance of masculinity in creating and justifying wider social hierarchies. The effects of such masculinity rankings on past and current male subjectivities or sense of self remain largely unexplored. Contestations over different forms of masculinity are likely to have been an intrinsic part of independence struggles, as for instance illustrated in M K Gandhi's refusal to accept the inherent superiority of a British masculinity that was increasingly equated with rationality, materialism, and physical strength, in favour of a more "Indian" masculinity (Nandy 1983).

The "making" of irrigation and the engineering profession as masculine has undoubtedly been deeply shaped by the intimate connections between engineering and the army (see Black 2009).² Till the 1850s, the executive responsibility for public works in British India rested with the Military Board, after which civil departments took over (Sharma 2008). The British military also had a major influence in the formation and organisation of the four Indian engineering colleges. Most instructors came from the army: Royal Engineers and their East India Company military counterpart, notably the Royal (Bengal) Engineers. Indeed, military and civil engineering were interchangeable, with a prominent role for the so-called sapper officers (Mital 1986). Also, the hydrocracy of that time, the PWD, was inhabited by sapper officers. In fact, it was a metamorphic organisation, subtly designed to rapidly transform into a military department should the need arise. This integrated civil/military role of the PWD evolved rapidly during the post-1860 era, as the Europeans resident in India feared another internal conflict. Indeed, most European civil engineers of the Indian PWD, just like other male Europeans in India, belonged to the part-time all-Europe Auxiliary Forces of India (AFI) which existed until 1947. Likewise, all the European students of Thomason college were compulsorily enrolled with Thomason Company of the Auxiliary Forces of India, but the majority of the Indian students were recruited into the Allahabad University Training Corps. The PWD, although technically a civilian organisation, continued to rely on military engineering during its life until 1947.

That the construction of engineering masculinities, or the forging of close associations between "being an engineer" and "being a (real) man", was so successful is most probably linked to the historical importance of irrigation in bringing about development and progress. Irrigation not just yielded rents and revenues, but was also crucial in the larger schemes of empire and state building (Gilmartin 1994). As in other countries, water resources development by the State in India has been (and perhaps continues to be) an important political strategy for controlling space, water and people and an important part of everyday forms of state formation (Molle et al 2009). Irrigation figured prominently in an ambitious civilisation mission and in larger dreams of modernisation, of making deserts bloom and bringing prosperity to all through huge infrastructural works. The strength of this "hydraulic mission" undeniably provided a strong boost to the power of engineers, helping them to become part of the ruling elite. It must also have helped reinforcing the idea of (and belief in) their manliness.

Thanks to the hydraulic mission, water engineering and the construction of large engineering works offered an assured route to a specific version of masculine heroism. Stories of engineers in colonial times, men like sir Arthur Cotton, William Willcocks, and Scott-Moncrieff, picture them as true pioneering champions whose designs and constructions were celebrated as triumphs. Their (auto) biographies³ reveal an evangelical, personal and lifelong preoccupation with military-like efficiency, ruthless practices and autocratic control. Many of these engineers maintain a glorious existence not only in the memories of today's irrigation engineers, but also in statues (Arthur Cotton even has a museum) raised in their honour at the intakes of the irrigation systems they originally designed. But also to Indians, and in spite of ideas among the British of their lesser suitability and manliness, engineering was a road to heroic success. Ram Ganga (1857-1927) is a clear example. Ganga was an engineering graduate of Roorkee (1873) and was recruited by the Punjab PWD. Amongst his pioneering civil engineering works was the irrigation of desert terrain to create land for a granary in Montgomery district (now Pakistan). He was a philanthropist and gave away millions for public benefit. Mital commented that Ganga was perhaps the greatest man Roorkee produced so far (Mital 1986). The continued attractiveness of such stories about engineering heroes suggest that irrigation constituted an important site for the construction of images of modern masculinity and masculine heroism in wider society.

Training as an irrigation engineer offered a favoured route to modernity and status to "local" boys; it was bound to bring them professional success and prestige. In the analysis of Gilmartin:

It was the ethos of disinterested service to science that empowered the self-image of many engineers as engaged in a moral enterprise, "content", as one engineer put it, "to let their achievements speak for themselves" even as they strongly identified with the power of the state (2003: 3).

He continues:

The public commitment to scientific control over nature which was linked to service to the state worked for British and Indians alike. For Ram Das Tandon, an Indian who graduated from Roorkee in 1898 and joined the Punjab Irrigation Department, the process of becoming an engineer at the college was like passing through a transformative 'dream', defining an entirely new 'public' identity (ibid: 3-4).

Becoming an irrigation engineer, therefore, also meant learning to perform a specific version of masculinity; one that symbolised being in control, rational and self-confident, and implied joining the ranks of those in power.

The progress and modernity that was promoted through the development of new and modern irrigation systems therefore went accompanied with the promotion of new and "modern" versions of masculinity. Training to become an irrigation engineer at the service of the State not just implied learning to speak the mathematical language of scientific engineering, but also meant learning to assume the prestigious, and undeniably masculine, identity that came with engineering work. In fact, analyses such as the one by Gilmartin (1994; 2003) suggest how irrigation modernisation involved clashes between old "feudal" masculinities and new "modern, professional" masculinities, clashes between

"modern" engineers who based their demands for more water powers, and arguments for technocracy, on scientific rationality and "traditional" leaders who based their water powers on history and local knowledge.

[F]or many engineers the necessity of undercutting the position of these men [the traditional canal *sarpanches*] was at the very heart of 'scientific' management. Writing in 1909, E S Bellasis, the Superintending Engineer of the Derajat Circle, attacked the old system [...]. The root cause of 'popular' complaint at irrigation reforms, he said, lay in the power to control water that 'big men' had previously exercised all along the inundation canals of southwestern Punjab (Gilmartin 1994: 1141).

Throughout the 20th century, masculinist professional irrigation languages and identities became increasingly globalised and universal: irrigation engineers in Egypt, India, France, Australia, the US and the rest of the world started to view water in the same mathematical terms, and the hydraulics of irrigation channels and the mechanics of dam construction were also the same whether applied in California or the Indus Basin (ibid: 1136). The foundation of the International Commission on Irrigation and Drainage (ICID) in 1950 is a clear mark of the internationalisation of irrigation knowledge, and its congresses not only helped consolidate a particular epistemic tradition, but were also instrumental in establishing a global brotherhood of irrigation engineers, of inculcating an esprit de corps amongst professionals and carving out a distinct, and distinctly masculine, engineering identity.

In all, a feminist reading of the history of engineers and the hydrocracy in south Asia yields important elements to suggest that, and how, the profession has been shaped through and by racial and gender hierarchies and exclusions. It also shows that there is nothing "natural" or "normal" about the association between (white) masculinity and engineering: this association is a (only partly deliberate and conscious) specific historical and social construction that serves to lend the profession status and prestige.

Hydrocracies as 'Masculine' Organisations

In a previous article I wrote about masculinities and irrigation, I suggested there might be a reduction (for various reasons, also see Molle et al 2009) in the (perceived) power and importance of irrigation engineers in creating national prosperity, resulting in a decline in their status and prestige and in a felt need to redefine their professional identity. I hypothesised that this might compel the hydraulic bureaucracy to open its doors to female engineers, and to people from other disciplines (Zwarteveen 2008). Yet, two recent studies refute this optimistic hypothesis, at least for south Asia (Kulkarni et al 2009; Bhushan and Zwarteveen 2010). What these studies show is first of all that engineering continues to be by far the dominant discipline of those working in state irrigation agencies. An analysis of the Department of Irrigation (DOI) in Nepal, for instance, shows that this dominance of engineering is reflected in, or part of, the continued emphasis on the construction of new irrigation systems as the main *raison d'être* of the department. DOI formulates its organisational mission as consisting of the construction of viable (in terms of returns to investments), sustainable (managed by users) and efficient (in terms of cropping intensity) irrigation systems. The main criterion DOI uses to

assess its own performance is the achieved increase in irrigated area. And though DOI does hire some sociologists (less than 1% of the staff), these are not offered the same chances of promotion and salary increase as engineers (Bhushan and Zwartveen 2010). Irrigation agencies in Bangladesh, Maharashtra, Andhra Pradesh, Pakistan and Sri Lanka likewise continue to be predominantly inhabited by engineers. In Maharashtra, social scientists are only hired on temporary contracts (Kulkarni et al 2009). This persistent engineering dominance is remarkable, given the efforts of the last decade or so to “reform” irrigation bureaucracies and policies. Starting as far back as the 1970s and 1980s, irrigation bureaucracies have been the target of much criticism. In response, much (donor) money and efforts have been invested in “transforming” the bureaucracy (see Mollinga and Bolding 2004), making them less construction and more management oriented, more transparent and more accountable to farmers. Yet, whatever such reform efforts have achieved, they have apparently not succeeded in challenging the strong engineering orientation of the hydrocracy.

Given the strong association of (especially civil and agricultural) engineering with masculinity, it is perhaps no surprise that government irrigation agencies in south Asia also remain strongly male-dominated. Women only constitute between 2 to 4% of the engineering staff of government irrigation agencies in the countries mentioned above. And those few women working in the irrigation bureaucracy mostly are in the lower ranks of the organisation. Interviews with them also suggest the continued existence of a gendered division in tasks, with more women working in the less prestigious administrative office jobs and more men being involved in the “on the site” construction and implementation tasks that wield more status and powers. Women engineers often feel they do work that is (far) below their capacities. Many do desk work, and are asked to do all kinds of administrative and secretarial tasks. Although some women themselves indicated finding it difficult to combine travels to field sites with domestic caring duties, many others felt they were deliberately kept away from field sites by their male colleagues and superiors. Men justified this by simply saying that field work was not suitable for women (Kulkarni et al 2009). Also at the level of education it is clear that (civil and agricultural) engineering continues to be seen as more (or just) suitable for boys, with very low numbers of female students in engineering education throughout south Asia (with numbers being a bit higher in Sri Lanka) (ibid). In Nepal, in the Nepal Engineering Council, for instance there are 4,524 registered engineers of which only 195 (or 4.56%) are women (in December 2003; ibid). If women choose an engineering course, it is mostly architecture (ibid). In Faulkner’s terms, irrigation is a gender authentic choice for boys, and an inauthentic one for girls (Faulkner 2007; 2009), which is why women always have to explain why they choose to study engineering.

Normal explanations for the numerical dominance of men in government irrigation agencies tend to take the masculinity of the profession for granted, and use a rather static “exclusion narrative” to identify “deficits” in women (that explain why they are either reticent to choose an engineering career or why they are

less suitable) or deficits in engineering education (Faulkner 2007: 169-70). A shift to looking at hydrocracies from a feminist masculinities perspective would imply a focus on how genders are performed within engineering communities of practice, or to how particular femininities and masculinities are actively constituted through everyday interactions and social institutions (ibid). Although little of such work has been done, the cited studies of irrigation bureaucracies in south Asia suggest that the irrigation profession and the professional status of those working in the field of irrigation continue to be delineated through a gender demarcation. Interviews with water professionals show very clearly how attributes and skills that are seen as typical characteristics of good irrigation professionals are also the characteristics associated more with men than with women. Indeed, deep gendered dualisms are at the heart of engineer’s identities as engineers, as represented in the following table:

Table 1: Gendered Dualisms and Engineering Identities

Men/Engineers	Women/Non-Engineers
Site work/travel	Staying close to home
Calculations	Values, opinions
Technical	Social
Hard	Soft
Strong	Weak
Corrupt(ible)	Honest, decent
Rational	Emotional
Courageous, daring, tough	Cowardly, timid, lenient
Leading	Following
Action/construction	Communication
Selfish	Empathic
Macro	Micro
‘Hardware’	‘Software’

Source: Compiled on the basis of Kulkarni et al (2009) and Bhushan and Zwartveen (2010).

The table suggests that the historical predominance of men in the engineering profession has shaped professional identities and cultures through a strong gendered dichotomy, which has coalesced into a set of firmly established notions and practices which confirm that the work of irrigation is part of a public domain in which men and particular forms of masculinity associated with them seem to “naturally” reign. Workplace social practices thus tend to favour such men without question and often in subtle and insidious ways. They preserve male dominance by coding activity and assigning meaning as either superior (male, masculine) or inferior (female, feminine) while at the same time maintaining the plausibility of gender neutrality (Ely and Meyerson 2000: 115-17). The two columns in the table are thought of as mutually exclusive: you are either a man and an engineer, or a woman and therefore by definition not an engineer. Combining the two identities, therefore, is difficult, risky or simply implies that one of them suffers. In any case, it requires (hard) work. Hence, if a female engineer is successful as an engineer, she risks being accused of “unwomanly” behaviour. As one assistant engineer of the Bangladesh Water Board says: “if a woman is successful, she is told that she is egoistic and stretching herself too far” (Kulkarni et al 2009: 35). Hence, women need to actively invest in constructing themselves as credible engineers, while maintaining themselves convincingly as decent women (Faulkner 2007: 334). Unlike male engineers, women engineers

have to do “gender work”; they have to carve out new gender identities as women engineers. Many of the collected stories of women engineers represented in the cited study provide evidence of such gender work (Kulkarni et al 2009); they show how women skilfully negotiate and shape their gender and engineering identities, often illustrating that possessing so-called “masculine” abilities and skills does not (have to) imply a lack of femininity. For women, belonging and becoming respected as engineers within the organisation is a challenge. The same is true, to some extent, for male engineers who want to emphasise the importance of capacities that are thought of as feminine: they have to creatively show how attention to for instance communication can be combined with “being a real man” in order to be convincing (Bhushan and Zwartveen 2010 give an example).

The “normalisation” of the women engineer is a process that goes beyond numbers: it involves changing norms so that engineering becomes a “gender authentic” option for both women and men. The few studies cited above reveal how spaces and opportunities for positive change can be identified in documenting the actual practices of men and women engineers, as these often reveal creativity and agency in negotiating their gender and professional identities. Identifying these social practices and documenting their effects on women’s and men’s experiences is the starting point for questioning gendered power in the irrigation profession.

Conclusions

In this article, I have tried to suggest that hydraulic bureaucracies form an important domain in which (specific) masculinities are played out and performed. At least during and since colonial times, irrigation has become and continued to be an important site for the construction of gendered power and hegemonic masculinities, with the creation of heroic male projects and the building of empires playing (and perhaps continuing to play) an important role in shaping images of masculinity and masculine heroism in wider society. Also today, in water management and engineering, gender continues to be a key principle of cultural-valuational differentiation, with the authoritative construction of norms that privilege traits associated with masculinity, and the simultaneous

pervasive devaluation and disparagement of things coded as “feminine” (Fraser 1997: 20). This strong connection between masculinities and irrigation cultures and identities may provide an important explanation of why hydraulic bureaucracies are so resistant to change. The connection allows a naturalisation of engineering identities by linking them to male bodies, making engineering and masculinity seem both inseparable and in opposition to femininity. A career in irrigation has offered and continues to offer men a safe and reliable route to becoming a “real” man, someone who is respected and valued. The association with manhood, at a symbolic and cultural level, provides engineers and the hydraulic bureaucracy with a distinct reputation; it helps maintaining an image of importance and heroic prestige.

To date, the explicit questioning of gendered structures, identities and symbolisms are not considered as requiring explanation and discussion with respect to water.

Mutually reinforcing processes of normalisation and naturalisation work to delegate these issues to the domain of the undisputed. However, showing that engineering identities and organisational cultures are not reflections of a “normal”, universal and abstract ideal, but instead correspond to very particular ethnic, gender and class-related models of whiteness, masculinity and superiority (Boelens 2008) – or showing that and how engineers and their work spaces *are made* masculine – is very much needed.

Indeed, the continued masculinity of irrigation is a problem that urgently requires critical investigation. Such investigation should go beyond static exclusion frames of analysis, and make use of feminist studies of masculinities, technology and organisations to conceive of water management and engineering as *cultures*, looking at how professional identities and genders are mutually shaped and performed within engineering communities of practice. The analysis should set out to challenge essentialist understandings of “femininity” and “masculinity”, and understand genders as multiple, fluid, and relational (Faulkner 2007). Such studies will serve both as a first step to create more space for women engineers in government water agencies, and importantly contribute to unravelling important aspects of the cultural politics of water.

NOTES

- 1 Elsewhere, I have elaborated another interesting topic for masculinity studies in water: the feminist analysis of water expertise (the third dimension) in which I link the difficulty to see women and gender in water to a particular epistemic tradition in knowing water that is deeply inhospitable to the analysis of social relations and gender (Zwartveen 2008).
- 2 Much of information about the linkages between the military and engineering is based on Black (2009).
- 3 Interestingly, the biographies of two colonial engineers (General Sir Alexander Taylor (1826-1912) and of Sir Arthur Cotton (1849-1904) were written by their daughters, Alicia Cameron Taylor and Lady Elisabeth Hope, respectively.

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