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The need for community inclusion in water basin governance in Bangladesh

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Abstract

In this paper we focus on the principle of community inclusion in water and ecological resource governance and document the negative impacts of its absence, in Chapra village, Bangladesh, on sustainable development and livelihood security. This community depends heavily on common property resources such as wild plant foods, fish and 'natural' crop fertilizers derived from river siltation and other sources. For the vast majority of people in Chapra, these common ecological resources create the ability to effectively match livelihood strategies to the conditions of both dry and rainy seasons. However, this socioecological livelihood pattern is increasingly undermined by the hydropolitics and top–down water management practices that prevail throughout the Ganges–Brahmaputra Basin in Bangladesh. These practices lead to ecosystem failures and ecological resource degradation which in turn cause survival challenges for the marginalized people who constitute the vast majority of the population. In this paper we explicitly seek to answer the question: how might community inclusion in governance processes help protect ecological integrity and common property resources and thereby support an alternative and more sustainable form of development for the region? In order to answer this question we first document the nature of livelihood practices in Chapra, based on 1 year of fieldwork, and then outline the mismatch that now occurs between livelihood practices, ecological characteristics and governance practices. We conclude with the argument that greater community inclusion in governance must be part of the solution to existing problems and we propose specific governance reform measures to facilitate community inclusion.

Background

The research that informs this study was conducted in Chapra village, Kushtia District, Bangladesh, located about 20 km east of the Indian border. Chapra is located within the Ganges Dependent Area (GDA) in Bangladesh which, in turn, is located within the Ganges–Brahmaputra Basin (GBB), one of the largest river basins in the world by area and second only to the Amazon in terms of the total volume of water it carries (see Fig. 1). The livelihood challenges faced by farming communities in Chapra are typical of those that occur throughout the GDA in Bangladesh and in some respects are representative of those that occur throughout the entire basin. Water governance structures in all the basin countries tend to be highly centralized and this is particularly the case in Bangladesh. Chapra is just one of many communities that has experienced a significant reduction in water availability due to upstream diversions from the Ganges River by India but

Fig. 1 The Ganges–Brahmaputra Basin in China, Nepal, Bhutan, India, and Bangladesh. Source: Wikimedia (2015)

they have also been harmed by actions taken by their own government, typically with the support of international donor organizations. Why would the Bangladesh government and a host of well-intentioned international donors take actions that would harm rather than benefit rural communities throughout the GDA? Many factors combine to create the negative outcomes we document in this paper, but foremost among them, we believe, is the almost total exclusion of local knowledge and local people within water governance institutions.

We begin our analysis with a brief description of the physical characteristics of the Ganges–Brahmaputra Basin and the types of ecological resources and services it generates as common property in communities like Chapra. We then describe the ways in which regional and national hydro-political agendas drive governance processes without due regard for human rights, equity or sustainability. We then present evidence from Chapra to support our argument that hydro-politics and top-down government processes are harming rather than assisting local communities to sustain and/or develop livelihood capacities. We conclude with a discussion of governance principles and proposals for institutional reform based on problems identified at Chapra but known to exist throughout the GDA.

The Ganges–Brahmaputra Basin

The Ganges–Brahmaputra Basin (GBB) originates in the Himalayan Mountains, flows through China, Nepal, Bhutan, India, and Bangladesh, and ends in the Bay of Bengal (Fig. 1). Three percent of the basin lies in China, 14 % in Nepal, 79 % in India, and 4 % in Bangladesh (Ahmad and Ahmed 2003: 307). The Ganges River length is 2600 km, the world's thirteenth longest river, with a coverage area of 1,080,000 km^2 (Rahman 2009: 3). The two major originating branches of the Ganges are the Alakananda and Bhagirthi rivers that flow southward and meet in Garhwal district of Uttarkhand province in India. Some tributaries of the Ganges originate in China like the Karnali, the Gandak, and the

Kosi, some in Nepal like the Rama Ganga, the Sarda, the Karnali-Rapti, and the Gandak-Kosi, and others in India like the Yamuna and Gomati. All connect with the Brahmaputra River in Bangladesh (Parua 2010: 267–8).

The Brahmaputra River originates on the northern slope of the Himalayas in the Kailash range in China and flows eastward as the Tsangpo River about 900 miles. It then turns southward entering the Indian frontier at Sadiya, Assam State, as the Siang or Dihang River. The total drainage area of the river within India occupies 97 % of Arunachal Pradesh, 90 % of Assam, 50 % of Meghalaya, 65 % of Nagaland, 100 % of Sikkim, and 15 % of West Bengal (Sarma 2005: 452). As with the Ganges River, the combined drainage of the Brahmaputra flows through Bangladesh before it reaches the sea in the Bay of Bengal.

The GBB functions as a single ecological unit throughout its entire range and in this paper we emphasize the fact that it is a social as well as ecological system, a waterscape in Baviskar's (2007) terminology and a total social fact according to the approaches of Orlove and Caton (2010: 402) and Wagner (2013: 2). In the Ganges Basin, where this study is situated, two characteristics, high altitude headwaters and flat terrain valleys, provide major ecological resource abundances for cropland soil fertility, domestic animal rearing and wild fish habitats (Ahmad and Ahmed 2003:3). The Ganges Dependent Area (GDA) in Bangladesh (see Fig. 2) was particularly rich in these resources prior to the massive interventions by the States of India and Bangladesh over the past half century. The Gorai River, a branch of the Ganges River in Bangladesh is the major foundation for the regional ecosystems we describe in this paper, in Kushtia District, but also for many other ecosystems including the Sundarbans.

Chapra

Kushtia District has a population of 1.8 million people with an average density of 1073 people per square kilometer (Bangladesh Bureau of Statistics (BBS) 2011). Ninety-six per cent of the people are Muslim and four per cent are Hindus and other religious believers. Chapra village, the source of this paper's fieldwork data, is located along the Gorai River 7 km south of where the Gorai branches off from the Ganges. It is composed of six sub-villages with a total population of 4331 people, making it the largest of several villages under the jurisdiction of the Chapra Union Council, which in turn falls within the Kumarkhali Upazila Parishad (Sub-district). Seventy-six per cent of the population of Chapra and 963 of 1387 households make their livings in the agricultural sector and 40 % of this population are females. Another 12 per cent of the local population make their livings as day labourers in various employment sectors including agriculture (Bangladesh Election Commission 2011).

The agricultural sector in Chapra and throughout Kushtia District is marked by extreme inequality. Wealthy farmers make up 1 % of the farming population in the District; intermediate farmers make up 8 %; small farmers 51 % and marginalized farmers 41 % (Bangladesh Bureau of Statistics 2005). Fourteen percent of the marginalized farmers own no farm land at all but depend on farm labour for all or most of their income. We use the term "wealthy" to refer to households classified as "large" by the Bangladesh Bureau of Statistics (BBS) (2005). Large households are those who own 7.50 acres or more agricultural land. BBS classifies those owning from 2.50 to 7.49 acres of land as

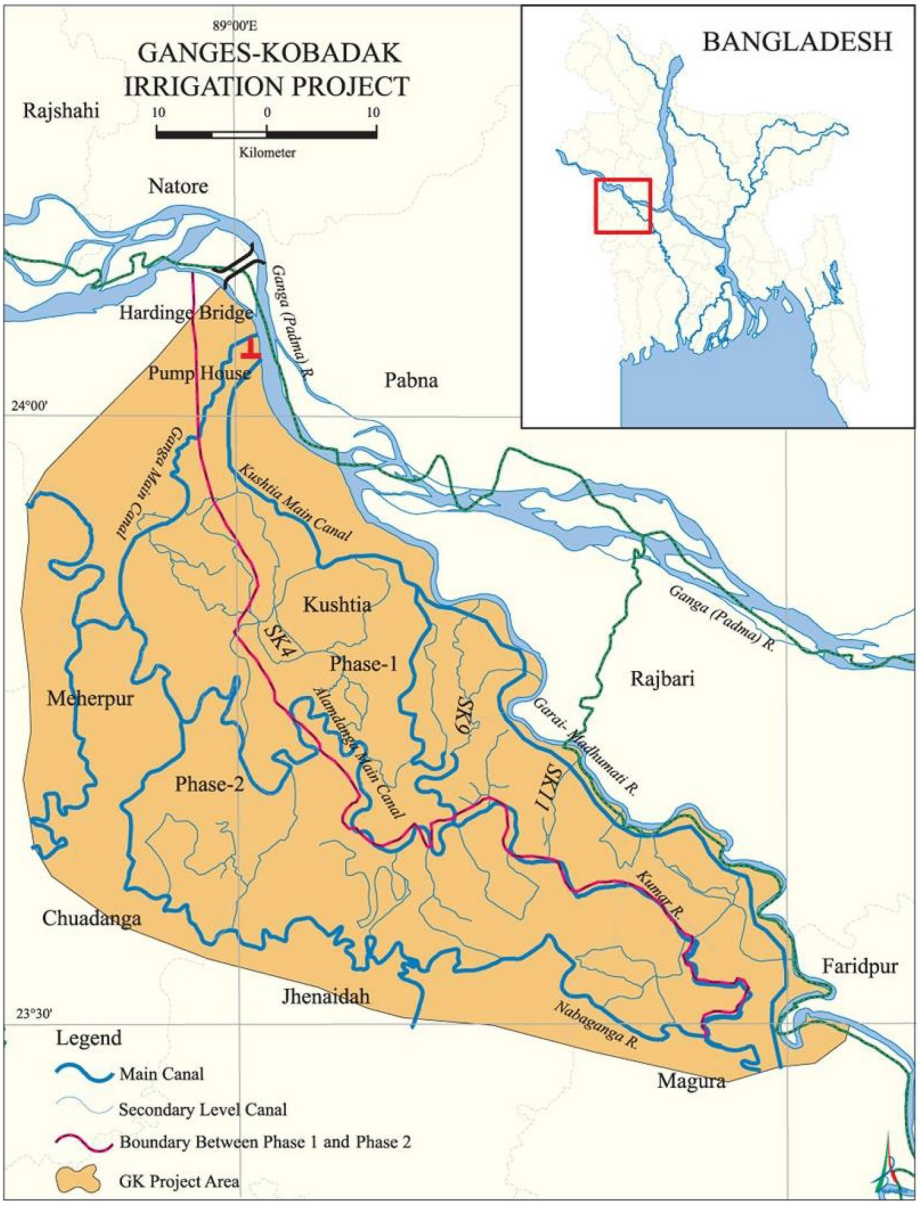

Fig. 2 The GK project area. Source: adapted from Banglapedia (2012)

"intermediate". Those owning from 0.50 to 2.49 acres are classified as "small", and those owning less than 0.49 acres are classified as "marginalized". In this paper we use the term marginalized to refer to both the small and marginalized groups as defined by BBS since, as we explain below, a family with less than 0.5 acres of land cannot meet even their most basic needs in the absence of a secure and affordable supply of water and access to the common property resources that were formerly an integral part of their livelihoods. The marginalized group has a combined population of 274,141 people or 93 % of the total farm population of Kushtia District (Bangladesh Bureau of Statistics 2005).

The Chapra fieldwork data we describe here was gathered by Hossen during the course of his doctoral research in 2011 and 2012 (Hossen 2014). He gathered qualitative

and quantitative data regarding the connection between river water, agricultural practices and community livelihoods. Information was first gathered through focus group discussions (FGDs) that included individuals from 44 Chapra households, seven from the wealthiest households, nine from middle or intermediate households, and 28 from marginalized households (12 from smallholders and 16 from day-labourer households). Individuals from each group sat down separately with Hossen and his research assistants and discussed their local water concerns and opportunities. Based on the advice of FGD participants, Hossen then selected four households, one each from the upper, middle, lower, and day-labour categories, for more in-depth case studies. The case studies also provided Hossen with the opportunity for participant-observation. Finally based on the FGDs and case study information, he collected survey data from a stratified random sample of 259 respondents, among them 34 women respondents; 204 respondents were from marginalized households.

The Gorai River is a branch of the Ganges that has it origins in Kushtia District and provides ecological services like fresh water to the southwest hydrological region of Bangladesh over a distance of 199 km with a catchment area of 15,160 km^2. Chapra villagers are entirely dependent on the Gorai and Ganges Basin waters for their livelihoods, which in turn depend entirely on agricultural production. This basin flow provides ecological support to local water bodies like the Chapaigachi *Haor* (oxbow lake), Chapra and Lahineepara *beels* (wetlands), Lahineepara and Shaota *khals* (canals) at Chapra. These water bodies are connected with local croplands and are helpful for producing crops, catching fish, sailing boats, visiting relatives, organizing water sports, and providing resources for celebration. Irrespective of their socioeconomic conditions, everybody has an equal right to use the basin flow and local, naturally produced ecological resources without any discrimination. They hold a detailed understanding of the dynamics of winter, summer, and rainy seasons and have adapted to these seasonal patterns by practicing three distinct cropping patterns known locally, in the Bangla language, as *kharif*-1, *kharif*-2, and *robi*.

The *kharif*-1 cropping pattern occurs during the period from March to May during the mid-spring to mid-summer seasons. The *kharif*-2 period occurs from June to October during the mid-summer, rainy or monsoon, and autumn seasons. The *robi* cropping season is the dry period from November to February in late autumn, winter, and early spring. They have developed and refined their crop schedule knowledge over several generations, creating a deep bond between themselves, the river water and land. As we illustrate in the paragraphs that follow, their practices include subtle and ingenious adaptations to local soil conditions but also include detailed knowledge of and a deep reliance on wild foods and other types of ecological resources historically managed and accessed as local commons.

The Gorai River is also a major source of fertilizer for Chapra farmers. The borsha or wet season brings siltation and algae to croplands and washes away exhausted topsoil. It also supports the growth of water hyacinth in local water bodies, which can be used as compost. Farmers also collect domestic animal dung and decompose it in a pit at his homestead. A long worm, locally called *kecho*, is also most active in the beginning of the borsha season, burrowing into croplands and improving cropland fertility. Farmers

have also developed practices that allow them to maximize the benefits of seasonal *kecho* activity.

Chapra farming households also utilize river-dependent ecosystem resources to raise cattle, hens, chickens, ducks, goats and sheep. Ducks are taken to a local wetland to forage; local plants are collected as feed for cattle; water hyacinths, banana plants and bamboo leaves are used as fodder for bullocks and goats. With access to these resources, farming households can then have continual access to eggs and meat from chickens and ducks that are able to reproduce and maintain their population indefinitely. Bullocks fed with wild plant resources provide fertilizer and fuel from dung as well as their labour; cows provide milk every day and produce calves every year. Excess domestic animals, eggs or milk can be sold for cash.

Farming families also gather wild vegetables for personal consumption. Water lilies, marsh herbs, water spinach, hyacinth beans and ferns are available at local wetlands. Poorer families are especially reliant on these foods during times of food shortage. Wild bananas are also readily available close to their homesteads, in forested areas and along the Gorai River banks. Poorer households are also able to gather fruit, midribs and inflorescences from wild, roadside banana plants and they also gather and eat the leaves and roots of arum plants.

The borsha season also provides more than sufficient fisheries in local lakes, ponds and wetlands. When large fish, like carp, are caught, they will often be shared with relatives and neighbours. The more affluent farmers will often create artificial ponds or modify existing ponds to create fish habitat. Water hyacinths grown at a pond's edge, for example, will provide suitable habitat for catfish and snakehead fish while water lilies in the same pond will support carp populations.

Under normal conditions, seasonal water flows also provide employment for specialized occupational groups like boatmen, fishermen, blacksmiths, potters, thatchers and basket makers. The boatmen transport agricultural goods and services during the wet season, fishermen sell fish in local markets, potters, thatchers and basket-makers are able to find sufficient materials to make products for commercial sale. As with agricultural production techniques, these forms of local occupational knowledge are transmitted from one generation through oral traditions.

Over the past several decades, large-scale, government-sponsored interventions in local water systems have, unfortunately, interrupted these livelihood patterns and are increasingly disabling the transmission of essential knowledge to the younger generation. This disabling of traditional livelihood patterns would be acceptable if sufficient employment at reasonable wages were being generated as an outcome of government initiatives but, as we will demonstrate in the following section, this has not been the case. Instead the interventions have benefitted mainly a small group of wealthy farmers (0.52 % of the population) and some of the middle-class landholding group (6.5 % of the population), while those with no land or very small landholdings (93 % of the population) find themselves increasingly marginalized. Consequently, many residents of Chapra are experiencing major violations of their human rights as defined by the United Nations, rights to water, food, employment, health care, education, and housing (Hossen 2014). These human rights violations do not just affect individuals alive today; they are

inter-generational in impact as when families are displaced permanently from ancestral homes with no chance of recovering them.

The cumulative impact of top–down government interventions

Three government interventions in the Ganges Dependent Area and the Gorai River Basin are mainly responsible for the human rights violations noted above, as a consequence of their cumulative impact on the flow of water over the past several decades. In this section we will describe and evaluate the impacts first, of the Farakka Barrage, built in 1975 by the government of India on the Ganges River, a short distance upstream from the border with Bangladesh. India built this water diversion without agreement from Bangladesh and its history provides an effective illustration of South Asian hydropolitics. We then examine the impacts of the Ganges-Kobodak Project, completed in the 1980s, and the on-going Gorai River Restoration Project, both engineered by the government of Bangladesh with strong involvement by outsider donor organizations including the World Bank. Both illustrate the negative impacts of an extremely centralized government that constructs its relationship with rural populations on the basis of political patronage and neoliberal economic policies. The negative impacts include an increase of inequality between rich and poor, an overall worsening of the livelihood situation for the majority of farming households, and environmental degradation of the Ganges and Gorai River Basins in Bangladesh.

The Farakka Barrage

The government of India built the Farakka Barrage unilaterally in 1975 about 17 km upstream of the Bangladesh border. The main purpose of the diversion was to divert water into the Hooghly River in order to limit siltation problems in the port of Calcutta. The dam is also used to generate a small amount of hydro-electricity and some canal water is used for irrigation purposes before it reaches Calcutta. This diversion, of course, reduces the volume of flow into Bangladesh, particularly during the dry season when it is most needed.

Planning of the Farakka Barrage began when Bangladesh was still part of Pakistan and the Pakistani government of that period was unable to resolve the dispute that erupted because of India's non-cooperation (Khalid 2010). Once Bangladesh became an independent country in 1971, a new era of conflicts began but, given the intransigent position of India, the newly independent Bangladesh did not have the power to prevent the dam's construction. After failing to resolve the dispute, Sheikh Mujib, President of Bangladesh, agreed to operation of the barrage for a forty-day trial period in 1975 (Swain 1996: 1991). After this trial period, India continued to operate the facility without Bangladeshi approval (Nakayama 1997: 377). On an annual basis, the Ganges River flow to Bangladesh lessened by 70 % and it has never returned to previous levels (Bangladesh Water Development Board 2012).

The governments of India and Bangladesh have since attempted to regulate the diversion through the signing of two memorandums of understanding and two treaties. According to the most recent treaty, the 1996 Ganges Treaty signed for a thirty-year period, India guarantees a minimum flow of water to Bangladesh during the *khora,* or dry season, from 1 January to 31 May. The treaty has not had a positive impact on dry

season flows, however (Verghese 2006: 14; Hossen 2014: 64–71). For example, the average basin flow at the border, at Hardinge Bridge Station, was 2360 cusecs during the summer season in 1970, before construction of the dam, but that shrank to 927 cusecs in 1980. This flow shrank still further to 828, 766, and 743 cusecs in 1990, 2000, and 2010 respectively (BWDB 2012; Hossen 2014: 66–68). Because of this Ganges flow reduction, the Gorai River flow is also reduced significantly. In 1973, the Gorai River flow was 190 cusecs but it was only 2 cusecs in 2003 (Islam and Ganuack 2011: 6). The reduced Ganges River flow is estimated to cause US$ 600 million annual loss to the agricultural sector alone in Bangladesh (Khan 1996: 19).

Due to this flow reduction, the basin communities at Chapra fail to get regular *borsha* or rainy season flows and frequently encounter *bonna* or severe flooding during the wet season when India has reason to avoid diversions into the Hooghly. Climate change and other changes to the Ganges Basin throughout its length in India contribute to the severity and unpredictability of extreme flood events. Chapra and other GDA communities in Bangladesh are also more likely now to encounter *khora* or drought during the summer season, which is responsible for damage and loss of agricultural crops, household assets, and employment opportunities. The loss of water also reduces flows to local lakes and wetlands and thus reduces the supply of common property resources essential to the livelihoods of the majority of farming households.

The Ganges-Kobodak project

The Ganges-Kobodak (GK) project is a state owned and directed water modernization project. Project planning began in 1955, well before construction of the Farakka Barrage, by the East Pakistan Water and Power Development Authority. It was part of a master plan designed to manage flood control, drainage and irrigation issues simultaneously (Chowdhury 2009: 3; Thompson and Sultana 1996: 1). The irrigation component of the GK Project involved the construction of a series of canals that divert water from the Ganges River at a point several kilometers upstream from where the Gorai River branches off from the Ganges. It was under construction at the same time as the Farakka Barrage but not completed until 1983, several years after the barrage began operation and, as a result, planners were forced to accommodate the changes brought about by the Farakka diversion. During the 1970s its design was also modified to be consistent with the United Nations' Flood Control, Drainage and Irrigation Program (Alexander et al. 1998; Talukder and Shamsuddin 2012) and in support of the goals of the Green Revolution (Cleaver 1972: 177; Herring 2001: 235).

The project encompasses an area bounded on the north and east by the Gorai and Madhumati Rivers, on the south by the Nabaganga River and on the west side by the Mathabhanga River. It covers thirteen *upazila*s of the four districts of Kushtia, Chuadanga, Jhenaidah, and Magura with a total coverage area of 1655 km and 488,032 acres of cropland. The total population of the GK project area is 2.5 million, 0.15 million of whom own agricultural lands (Fig. 2).

The project was not able to compensate for the loss of water due to the Farakka Barrage but because of the decreasing flow of water in the Ganges and Gorai Rivers, the GK canals have become the main source of irrigation water for agricultural production in Chapra and throughout the GDA. Thus, rather than supplying a secure, supplementary

source of water, it has led to increased farmer reliance on a government-operated water system subject to capture by elite interests. The project has not met even its minimum objectives in respect to irrigation water but, to make matters worse, it has seriously disrupted the natural flow of water to lakes, ponds and wetlands in the Chapra region. It has also caused a significant number of displacements of people and changed local settlement patterns due to the placement of canals, buildings, and roads. The project failed to provide reliable a water supply, in part, because it failed to take account of local agro-ecological systems, seasonal practices and cropping patterns. Performance has also been reduced by the more frequent occurrence over recent decades of floods, drought, water stagnation, riverbank erosion and embankment failure due to Ganges flow irregularities. The project thus displaced relatively egalitarian water practices with ones controlled by local elites operating under systems of political patronage. Moreover, the project transformed self-sufficient local agricultural and employment practices into a system of market relations in which 93 % of the population are unable to achieve basic human rights (Hossen 2014).

The Gorai River restoration project

The combined effect of the Farakka Barrage and the GK Project has been to dramatically reduce water flow in the Gorai River and this has resulted in major sedimentation problems. The Gorai River restoration project (GRRP) was implemented in an attempt to restore river flow through dredging operations but like the GK project it has only worsened the situation for the majority of farming families. The Bangladesh Water Development Board (BWDB) implemented the project in 1998 with the assistance of the World Bank. Sedimentation is deposited along the shores of the river but also as islands in the middle of the river channel. These forms of sedimentation, known as charlands (Chowdhury 1984; Lahiri-Dutt and Samanta 2013), further reduce river flow and cause ecological service failures. Ninety-one percent of the households Hossen surveyed at Chapra in 2011 reported major challenges for practicing traditional agricultural activities due to failures of water supply and ecological services from the Gorai River and local water bodies. These water bodies include Chapaigachi oxbow lakes, Shinda and Shaota canals and the Lahineepara and Chapra wetlands, which were normally replenished each year by the Gorai River during the borsha season but sedimentation and erosion patterns now interfere with this process.

The GRRP is a major example of corporate as well as governmental control over local water resource management in Bangladesh. It was implemented as part of the World Bank's Flood Action Plan (Boyce 1990; Paul 1995; Thompson and Sultana 1996) and Integrated Water Resource Management program in Bangladesh (Ahmad and Ahmed 2003; Brammer 1990; Center for Environmental and Geographic Services (CEGIS) 2003; Gupta et al. 2005). Phase one began in 1998 and continued until 2009. The dredging started at the point where the Gorai River branches off from the Ganges and continued 20 km downstream, including the portion of the river that flows past Chapra (de Groot and Pieter 2001). Four foreign companies carried out this dredging at a total cost of $160 million (Khan 2012). Costs were covered by several external donors, including the Dutch government and the World Bank (Ministry of Water Resources 2001; World Bank 1998). Phase two of the project began in 2010 and continued to 2013 with a target area

of 36 km from Kushtia city to Kumarkhali Sub-district. Phase two overlapped somewhat with phase one since new sedimentation and charland emerged in some phase one areas after only few months.

The GRRP is a perfect example of the ways in which the political culture of Bangladesh and its top-down political processes tend to undermine local water management systems and promote corporate and elite control over local natural resources. The project was designed and implemented by the World Bank and the national government and, even when local government was involved, it was dominated by local elites. Local governments; were responsible, for instance, to renovate local water bodies and connect them with the dredged area. Local governments were also responsible for ensuring proper working conditions and ensuring the security of dredging machines and staff. Many of the staff were foreigners and knew nothing about local culture and tradition. They needed a secure environment, food and lodging arrangements from local governments and, in order to service these needs, the dredging company works closely with local government leaders but not with the communities those leaders are supposed to represent. Local political leaders are thus able to direct the project in ways that favor their interests but do not necessarily serve the interests of other community members.

The GRRP illustrates a major gap between the government water management systems and local community needs and desires. According to the stated goals of the GRRP, the central government wants to develop flood control and facilitate drainage during the rainy season and secure enough water during the summer that freshwater can flow to more southern points in the GDA including Khulna city, Mongla port and the Sundarbans. On the other hand, the focus group participants at Chapra explained to Hossen (2014: 85–86) that they want natural resources back, like siltation, algae, earth-worms and water hyacinth, to promote cropland fertility. They also want to get back waterborne wild vegetables like marsh herb, water lily, ferns and hyacinth bean and natural fisheries like carp, barb and minnow. They want to be able to make agricultural materials like ploughshares, frames, ladders and sticks from natural resources like bamboo, cane and wood, which are now in short supply.

Since the top–down approaches of both Indian and Bangladeshi governments are the source of many, if not most, of the current water governance problems in the region, solutions will need to come from the bottom-up and must take into account the interests of both nations, all classes and interest groups. However, the hydro-politics of South Asia as a whole severely limit opportunities for governance innovation and for that reason, in the next section, we provide a brief outline of regional hydro-politics. We then conclude with a set of proposals for governance system reform.

Hydro-politics of the Ganges–Brahmaputra Basin

Every country in the GBB wants to use its water resources to promote development. However, the complexity of upstream and downstream geographic positions and asymmetric economic–military power relations have made it difficult for them to work cooperatively to achieve their goals. India is able to maintain a position of hegemony in the region because its geographic, economic, and military supremacy by comparison to weaker Nepal, Bhutan, and Bangladesh. In order to exploit its position of strength, India follows a bilateral approach and refuses to participate in basin-wide negotiations

or management agreements. It also refuses any third party involvement in the Ganges Basin management (Hagerty 1991: 351). Only China is in a position to challenge India's hegemony.

India's bilateral approach has allowed it to make contradictory arguments about the rights of upstream versus downstream countries. For example, when the Government of China announced on 8 November 2010 that it would build a hydropower project at Zangmu on the Tsangpo River, an upstream tributary of Brahmaputra in Tibet, India invoked international water laws and conventions to argue that China, Nepal and Bhutan, as upstream countries did not have the right to build any water project that could harm their interests as the downstream country (The Hindu 2010). However, India does not respect those same laws in respect to Bangladesh, where it is the upstream country. When necessary, India uses military forces to ensure its regional supremacy (Kapur 1988: 698; T.J. 2013).

India's domination of Nepal is evident in the Kosi-Gandak and Mahakhali water sharing agreements. The Kosi River agreement signed in 1954 was renewed in 1966 for a 199-year period without accommodating the grievances of Nepal (Iyer 2008: 10). The agreement allows India to establish infrastructure that is helpful for more land use and agricultural development in India. However, this infrastructure inundates additional land in Nepal and causes land and agricultural losses. In 1927, the Mahakhali River sharing agreement (Chakraborty and Serageldin 2004: 204) allowed the construction of a dam at Tanalkpur on the Mahakali River at the India Nepal border. The treaty was renewed in 1996 but without resolving bitter and protracted grievances from Nepal about their level of access to irrigation water (Bandyopadhyay 1995: 433; Chakraborty and Serageldin 2004: 204; Elhance 1999: 181). As a weaker and landlocked country, Nepal is particularly vulnerable to pressure from India to concede to its demands.

Bhutan, like Nepal, is also a much weaker, landlocked country with major hydropower potential. Bhutan has agreed to numerous hydropower projects that mainly serve India's interests: Jaldhaka (1961), Chukka (1976), Sankosh (1993), Kurichu (1996), Tala (1996), Punatsangcu I (2007), and Punatsangcu II and Mangdechu (2005) (Bandyopadhyay 1995: 431). (Rahaman and Varis 2009: 69). The analyses of Bandyopadhyay (1995), and Elhance (1999). Verghese and Iyer (1993) demonstrate India's dependence on Bhutan for water and power resources and willingness to maintain their hydro-political domination by whatever means are necessary.

India also insists on a bilateral approach with Bangladesh and on this basis the two countries established the Indo-Bangladesh Joint River Commission (JRC) in 1972, excluding the other GBB countries (Brichieri-Colombi and Bradnock 2003: 50). The JRC has authority to adjudicate problems arising from the operation of Farakka Barrage but, as noted previously, Bangladeshi grievances remain unresolved. This bilateral institution does not recognize or apply standard international water laws and conventions such the 1996 Helsinki Rules, the 1997 UN Watercourses Convention, and the 2004 Berlin Rules.

Even more worrisome is the fact that India is moving unilaterally to implement its National River Linking Project (NRLP), which will radically transform water flows throughout the GBB. The plan calls for the construction of two major canals that will divert water from the Brahmaputra Basin, upstream from Bangladesh, to the Ganges Basin in India. The first canal project will connect Jogighopa Barrage in Assam to the

Farakka Barrage via the Teesta River in the Indian State of West Bengal. The second canal will carry Brahmaputra water from Nepal and Bhutan to the Ganges (Rahaman and Varies 2009: 65). The intention is to divert 173 billion cubic meters water to several states in India that are subject to water shortages: Uttar Pradesh, Madhaya Pradesh, Rajasthan, Maharashtra, Gujrat, Orissa, Andra Pradesh, Karnataka, and Tamil Nadu (Ahmad and Ahmed 2003: 321–2).

Meanwhile, the government of China has its own major plans for the Brahmaputra Basin upstream from both Bangladesh and India. The government seeks to divert irrigation water from the Tsangpo to the Gobi desert (Horgan 1996). The Tsangpo Canyon is the deepest and longest canyon in the world with a 68,800 megawatt hydropower potential (Rahaman and Varis 2009: 70). Another national Chinese project, the Greater Western Route Water Diversion Project (GWRWDP), itself just one project within South to North Water Diversion Project (SNWDP) will also link with the *Tsangpo* River project (Rahaman and Varis 2009: 70). Chinese and Indian projects thus compete with one another and collectively threaten less powerful countries and regions with unparalleled environmental crises (Bandyopadhyay and Ghosh 2009; D'Souza 2006: 248).

Water governance reform through community inclusion

The top–down governance approach that dominates South Asian hydro-politics today is deeply rooted in the British colonial era (D'Souza 2006; Gilmartin 2015; Mulvany 2014) but is perhaps best understood as a localized expression of what Escobar (1996: 328) has termed "global ecocracy". Environmental management discourse in all basin countries is now framed in terms of "sustainable development" but the system is dominated by a huge managerial and technological apparatus (Swayamprakash 2014) that is devoted to extracting the maximum economic value from all basin resources including water. We have seen, however, in the case of Chapra, that the benefits of such a system are restricted to the elite while heavy costs are inflicted on the poor and on the environment itself. In this paper we propose instead an "ecocentric" approach to governance (Albert 2000: 27; Brunnee and Stephen 1997:41) that treats the water basin as a socio-ecological system (Berkes et al. 2000; Smith 2008; Wagner 2013) and incorporates measures to protect the property rights and human rights of basin residents. Governance should be democratic and multilateral, including all countries of the GBB (Bandyopadhyaya and Ghosh 2009: 50; Brunee and Toope 1997; Crow and Singh 2000; Faisal 2002: 322) and should focus on reducing vulnerability to ecosystem service failures. Following Folke et al. (2005), we note that sustainable ecological governance must be based on coordination among individuals, organizations, agencies, and institutions at the multiple scales. Our approach is consistent with the basic principles of Integrated Water Resource Management (IWRM) but, in agreement with Orlove and Caton (2010: 410), we emphasize the fact that IWRM does not provide guidance for how to realize those principles in the face of entrenched and systemic political oppositions. We also recognize that IWRM discourse can readily be captured within the discourse of global ecocracy, as has been the case in Bangladesh where pressures from the United Nations, the World Bank and other donor agencies have led to the insertion of IWRM discourse into state planning documents, but without implementation of those principles on the ground.

In developing our proposals for water governance reform we recognize the fact that concerted grassroots political action will be necessary to bring them into being and that such action could be thwarted indefinitely by intransigent national governments. However, we also believe that the meaningful change towards ecocentric governance cannot occur without precisely these kinds of reforms. We thus seek to offer practical political advice as well contribute to theoretical debates about governance. The reforms we envisage include the creation of "local parliaments of water" as they have been described by Latour (1998), not through central government mandate, as was the case in France, but through the coordination of village-level initiatives that rely on local knowledge, the defence of human rights, and application of international law in respect to water.

Our analysis indicates that reform is needed at all levels of the governance system in the GBB: international, national, regional and local. Given our emphasis on the need for grassroots initiatives, we begin with recommendations for local level reform and then move upwards through the system to conclude with a recommendation for a new international, watershed-wide institution that would be populated, at least in part, by village level representatives.

Local level governance

Water management institutions in Bangladesh exist at national, district, sub-district (upazila), and union levels but not at the two lowest levels of political organization, the ward and village. Villages can be as small as a few hundred people or as large as a few thousand. Wards are typically made up of two to four villages. Union and Upazila councils tend to be controlled by local elites since their resources allow them to build the patronage systems necessary to get elected. We propose the creation of an elected ward-level institution with each village in the ward electing its own representatives. This system would not automatically eliminate domination by elite interests but it would favor the election of more non-elite representatives. Elite domination could also be limited by forbidding political party members from running and prohibiting the involvement of national or regional political parties in elections.

Gender parity could be achieved by having one woman elected from each village on the basis of votes cast by women only, and some elected positions could be reserved for representatives of the economically marginalized households that constitute 93 % of the farming population at Chapra.

Election Councils should be established in each village to oversee elections. Election Council members and a Council Chief should be elected but would serve voluntarily. In this case also, political party members should be prohibited from running. The Election Council would be responsible to ensure that no Ward candidates received financial support from political parties or members of the local elite. Elections for the Ward level water governance institution should be held every 3–5 years depending on community preferences.

The elected village representatives on Ward Council should have office space and specific duties and responsibilities regarding local water governance. They should consult with villagers every week concerning local water concerns and issues and should bring those concerns forward to the Ward Council. The representatives' duties and responsibilities should be considered as full time jobs with an appropriate level of salary and benefits.

In order to ensure that the wishes of local institutions are not simply over-ruled by institutions at higher levels, ward-level institutions should have veto power in key domains of water governance such as infrastructure construction and water pricing. Higher levels of government would therefore have to consult with ward level institutions and take account of the knowledge and needs of the communities they represent.

National government agreement and legislation would be needed in order to provide local level institutions with veto power and properly integrate them with existing management institutions at higher levels. The granting of veto power is unlikely in the current political climate but local level institutions could be created as advisory bodies to begin with, and acquire formal authority later on. This type of grassroots movement may seem unlikely to many readers but citizens' movements of many kinds already exist throughout Bangladesh. Rather than engage in an argument here about the feasibility of this type of grassroots action under present circumstances, we simply wish to point out that meaningful change towards ecocentric and democratic governance will not occur in the absence of effective grassroots movements.

National and mid-level governance institutions

In addition to creating new institutions at the village and ward level, government institutions at union, upazila, district and national levels need to be reformed through a program of decentralization and democratization. Under the current system, some members of mid-level government councils are elected while others are appointed by the government. Since the elected positions are controlled by wealthy landowners and the appointed positions are given to government party supporters, these councils act mainly as agents of the national government not as democratic and representative forms of regional government. We recommend that the appointments now being made by the central government should be replaced with appointments made by each ward. Every Union Council has twelve wards and each ward could select two of their elected members to serve on the Union Council together with members-at-large elected from within the union boundaries. A similar approach could be applied at the upazila, district and national levels, so that local interests and local knowledge could percolate upwards in the system and counterbalance the controlling power of the central government.

Basin-wide water governance institution

Currently there are no over-arching formal agreements for water sharing and joint management of the Ganges-Brahamputra Basin. As described previously, there is a patchwork of bilateral agreements and a history of unilateralism by India and China. Both India and China are now trying to implement continental-scale river diversion schemes that will inevitably bring them into sharp conflict with one another as well as other basin nations in the upper Brahmaputra watershed in particular. There is an urgent need, therefore, to negotiate a multilateral agreement based on sound and consistent international water law and to establish a multilateral institution to oversee the terms of the agreement. A multilateral institution with legal decision-making authority could help restore some balance to the asymmetric power relations in the region (Bandyopadhyay and Ghosh 2009).

IWRM principles can also serve as the foundation for a multilateral approach. They are consistent with an understanding of water as a total social fact (Orlove and Caton 2010). They support the need for watershed-wide approaches and community inclusion. In order to actualize this broad vision of water governance we propose the creation of an elected council with equal representation from all five basin countries. Each country could hold four or five seats, irrespective of geographic and population size, in order to ensure a balance of national interests. Local community representatives at national levels in China, Nepal, Bhutan, India and Bangladesh will elect their representatives with direct votes. These representatives would need to be elected approximately every 4 years to ensure democratic process and accountability to the respective communities. Every country would need to provide financial and technical support for this institution so that it can function properly. This Basin Council would not replace existing technical and scientific institutions such as the bilateral Joint River Commission (JRC) created by India and Bangladesh in 1996, but would work as a pressure group for incorporating community voices in the deliberations of technical commissions.

Before executing any water development program, Basin Council members would consult with community representatives in their respective countries and the Council should hold a veto power that would allow it to protect the historical property rights and basic human rights of local communities. No water development programs would be implemented in the GBB without approval of the Basin Council. If a representative raises potential community concerns over a water program, the program needs to be reviewed and appropriate actions taken. This participatory approach can be a helpful mechanism for overcoming the existing top–down domination and local community's survival challenges.

The governance institution needs autonomy from political interferences (Nishat and Faisal 2000). For example, the current JRC does not have the ability to perform water management tasks independently because of political intervention. The new institution should function based on its institutional guidelines so that every country's community representatives can represent their voices. This institution should also include a meaningful third party participation in formulating and implementation of the GBB water policies based on community representatives. The third party can be an international organization like the United Nations which can overcome the current disagreements between the basin countries based on institutional guidelines.

Conclusion

Literally thousands of communities and millions of people in the Ganges–Brahmaputra Basin are facing survival challenges similar to those described for Chapra, in Bangladesh. The basin countries need to find solutions for these challenges so that they can sustain the environments and resources on which river-bank communities depend for their livelihoods. Ecological resource governance with an ecocentric approach rather the current top-down approach can be one major solution. The basin countries can use international water laws as guidelines for developing water governance institutions. The Berlin Rules, for instance, include guidelines for protecting "ecological integrity" by "establishing basin wide or other joint management arrangements".

Institutional reform is needed to provide for community inclusion at local, national, and basin-wide levels. The pathway to creating institutional reform on this scale will be long and complicated but we believe momentum is building, in Chapra and many other GBB settings, for just this kind of very badly needed reform.

Authors' contributions

MAH carried out the research on which this paper is based in 2011 and 2012 as part of his doctoral research at the University of British Columbia Okanagan. JRW supervised the research and visited the research site briefly in 2012. MAH wrote the first draft of the manuscript. JRW revised and reorganized the first draft. Both authors contributed equally to subsequent revisions. Both authors read and approved the final manuscript.

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