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Why Enough Is Never Enough: The Societal Determinants of River Basin Closure

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ABSTRACT *Manifestations of water scarcity are increasingly frequent, even in regions with temperate climates and endowed with good water resources. This paper argues that several ‘bad good reasons’ and mechanisms are at work to generate ‘overbuilt basins’, whereby the development of infrastructural resources invariably tends to outstrip available resources. Eight main drivers of basin overbuilding are proposed and discussed. Despite its crucial importance and ubiquity, this phenomenon is often overlooked. Unpacking the reasons why ‘enough is never enough’, i.e. why water resources become over-committed and river basins overbuilt, is critical if these mechanisms are to be countered.*

Introduction

Recurring accounts of water conflicts between countries, economic sectors or within irrigation schemes suggest that there is simply not enough water for all. Population growth, poor management, climatic change or vagaries of weather, or the growing needs of cities are some of the reasons commonly cited as the roots of water scarcity. With its ‘lion’s share’ of 80% of diverted waters, and a higher percentage in many developing countries, irrigation is also often painted as the villain of the piece: farmers allegedly ‘guzzle’ water while wasting a large part of it and depriving other users of needed resources. However, in many irrigation schemes a large proportion of the land often remains uncultivated in the dry season due to lack of water. In some years, even reducing irrigation’s share or discontinuing supply altogether does not prevent some cities from having their supply rationed.

This state of affairs, in a situation where the amount of renewable resources remains by and large the same,¹ questions the origin of water scarcity. This paper argues that several ‘bad good reasons’ and mechanisms are at work to generate ‘overbuilt basins’, whereby the development of infrastructural resources invariably tends to outstrip available resources. Despite its crucial importance and ubiquity, this phenomenon is often overlooked.

Water scarcity thus appears as being artificially created rather than the mere result of fatality. Eight main drivers of basin overbuilding are discussed in what follows; they do not, of course, entail that projects are necessarily unjustified, undesirable or biased. They merely draw our attention to how project planning may, and tends to, acquire a life of its

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own, overriding criteria of hydrologic or economic relevance. This has implications for policy making and it is argued that unpacking the reasons why ‘enough is never enough’, i.e. why water resources become over-committed and river basins overbuilt, is critical if these mechanisms are to be countered.

Engendering Water Scarcity

The Political Economy of River Basin Development

The most obvious driver of water resources development is the convergence of interests of all influential actors: (1) the state sees large-scale projects as political icons that build up legitimacy and political support from beneficiaries, while assisting in alleviating poverty in rural areas; (2) state line agencies, notably those involved in construction, consider the ever-continuation of projects as a professional necessity and as a way to perpetuate themselves and their budget. Examples from the US, Europe and Australia show that these agencies transformed themselves into environmental agencies when more construction became simply impossible;² (3) local politicians regard subsidized projects as a means to “create a powerful supportive constituency that will ensure political control over many years” (O’Mara, 1990, p. 3); (4) private construction companies and consultants take them as business opportunities and often have the political clout and linkages to push for such projects (Scudder, 1994); (5) for development banks, big projects hold the promise of concrete and large-scale changes, maximizing aid flow while minimizing project management costs (Howe & Dixon, 1993).

This convergence of interests easily generates powerful coalitions (Moore, 1990) that are seldom challenged and even more rarely defeated. While there is nothing inherently wrong in having different actors joining forces towards a common goal, the private financial and political benefits and rewards of such projects have often fostered rent-seeking behaviours, as cogently illustrated by Repetto (1986). In public administrations such behaviours may be encouraged by low salaries (Mathur, 2004). In the US, the so-called ‘iron-triangle’, linking state politicians, federal agencies and private companies, has long been famous for blurring the frontier between private and public benefits (Worster, 1985; Gottlieb, 1988; Briscoe, 1999³). Log-rolling, or the trading of votes between legislators pushing for their own project (the “Thou shall not attack a project from another district” principle, see Gottlieb, 1988), has particularly come to be one powerful engine behind water resources overdevelopment. In sum, “irrigation is so obviously a good thing, who can be against it?” (Berkoff, 2002, p. 7).

Ideology and State Building

Gigantic and prestigious engineering and technological feats have always been key elements of state building, flattering national pride, aggrandizing national leaders, and bringing legitimacy to rulers (Molle, 2006a). Just as Nehru famously spoke of dams as the “modern temples of India”, big dams and irrigation schemes were seen as heralding modernity and delivering development and prosperity: the Gezira Scheme in British Sudan would remain in history as a “great romance of creative achievement” (Ertsen, 2006), while the French sought to restore ‘Rome’s granary’ in Morocco. Many rulers would picture themselves as new pharaohs mastering the whims of nature and presiding over the destiny of their people.

This craving for modernity and gigantism was accompanied, or fuelled, by a vibrant ideology of domination of nature which has its roots in the enlightenment and in 19th century scientism, and blossomed during the 1930–70 period (Molle, 2006b). Inaugurating the iconic Hoover Dam, Theodore Roosevelt declared that “pridefully, man acclaims his conquest of nature”. In virtually all the countries nature was conceived as a threatening wilderness that needed to be tamed or subdued. In the Soviet Union, Gorki would support the plan to “make mad rivers sane” (McCully, 2001), in France, the Compagnie Nationale du Rhône would fight an “epic battle against nature” and the “furious bull leaping from the Alps” [the Rhône River] (Pritchard, 2004), while Mao declared a “war against nature”. In South Africa, scientists called for rivers to be “tamed and domesticated” so that “deserts [could be] turned into gardens” (Turton *et al.*, 2004). In Brazil, engineers and politicians drew inspiration from the Bureau of Reclamation in the US and launched a massive construction of reservoirs in the northeastern region of the country under the banner of the ‘hydraulic solution’ (*solução hidráulica*) (Guerra & Guerra, 1980). Mexico proclaimed its plan to ‘win over nature’ (*vencer a la naturaleza*). In his recent celebration of the Three Gorges Dam of the Yangtze River, President Zemin (1997) also referred to the “ancient Chinese people’s indomitable spirit in successfully conquering nature”.

Nothing in the ingenuity, labour and idealism invested in such projects must, of course, be belittled; they have indeed contributed to material progress and comfort based on electricity, water supply or irrigated food production. With hindsight, however, this particular conception of nature as an enemy to be subdued has contributed to fuelling massive projects that have been blind to our interdependence with ecosystems and have undermined our own resource base. Associated with the ubiquitous design to not let a single drop of water be ‘lost’ to the sea, this dream of fully controlling nature has contributed to the overdevelopment of river basins (Molle, 2006b).

Fuzziness of Water Rights and Double Accounting

An important aspect of basin overbuilding is the imprecise or faulty nature of hydrologic knowledge, which lends itself to a degree of manipulation, when it is not simply overlooked. There is no shortage of projects with optimistic assumptions on basin runoff and dams that have never filled up to the expected level. Even when hydrology was better known and a system of water rights was designed, experience shows that the tendency (that minimizes political stress) of over-allocating water in order to satisfy more users has been hard to escape (e.g. in Australia, rights had to be bought back or capped).

The review by Molle & Berkoff (2006) of the conflict between cities and irrigation showed that many cities reappropriate surface water or groundwater used by farmers either surreptitiously or with purposive omission of hydrological impacts on third parties: diversions invariably concern ‘surplus water’ (even when coming from dams with hardly any spillage, as in the case of the diversion from Veeranam tank to Chennai) and ‘preserve’ the needs of existing users (like the water from El Cuchillo Dam diverted for the human consumption of Monterrey, in Mexico) despite preexisting downstream use for irrigation.⁴ Double accounting of available resources is a common feature; for example, in Algeria the World Bank supported both irrigation projects and urban water supply networks in competition for the same scarce resource (Winpenny, 1994).

Popular thinking tends to see sciences such as hydrology as ‘hard’, neutral, authoritative and beyond value judgement, but differences in expert judgement on issues such as

estimating groundwater recharge, safe yields or even stocks, for example, show otherwise.⁵ Our understanding of hydrology, and in particular of its stochastic nature, is always partial and sometimes crude. Scientific assessments or feasibility studies are also influenced by beliefs, viewpoints and ideology (see, for example, diverging impact assessments of the south-north interbasin transfer in China in Berkoff, 2003, or in Hill *et al.*, 2003 for European cases). This hydrological uncertainty leaves room for interest groups to justify marginal projects in conditions of incipient basin closure.

The Malleability of Cost–Benefit Analysis

It is nothing novel to anybody involved in project design that cost–benefit analysis (CBA) is malleable. Anticipated values of yields, cropping patterns or market prices fall between wide open brackets and may vary widely (Berkoff, 2002). Categories of cost, benefit, life duration, discount rate, etc. can be manipulated to obtain very contrasting results (Ingram, 1971; Tiffen, 1987). While some acknowledge that the CBA is easily ‘corrupted’, others consider the variable results as a product of incompetence or bias, and not as a weakness of the method (Williams, 1972). It provides scientific support and legitimization, a sense of ‘mechanical objectivity’ that seemed to override the passions and interests that informed political debate (Porter, 1995), but may serve as a powerful tool “to clothe politically desirable projects in the fig leaf of economic respectability” (Marshall, 1965, cited in Ingram, 1971). Despite these alleged limitations and manipulations, the CBA may still allow someone to identify and weed out projects that are absurd from an economic point of view (Ingram, 1997).

The history of cost–benefit analysis shows that two devices have been, quite early in the US, designed in order to come up with acceptable cost–benefit ratios for projects that had been turned down earlier. According to Porter (1995, p. 181) “the Corps [Army Corps of Engineers] was engaged in a perpetual effort to push back the frontiers of cost–benefit analysis so that there would always be a manageable supply of economically approved projects”. As early as the 1940s, this led the Corps to considering five classes of ‘extended benefits radiating outward’ categorized as merchandizing, direct processing, other stages of processing, wholesale trade and retail trade.

The Bureau of Reclamation exhibited similar ‘accounting inventiveness’ in making ‘intangible benefits’ tangible and quantified (Porter, 1995). It also resorted to what was called ‘river basin accounting’, and was an early attempt to expand cost–benefit analysis to multipurpose water resource development projects. In the early 1940s, according to Reisner (1986), by considering an entire basin as an integrated project and pooling all benefits (e.g. irrigation, navigation, hydropower, etc.) together, the Bureau was able to further projects which would not make economic sense if considered in isolation. Irrigation costs, for example, could be offset by hydropower benefits.⁶

Such devices did not remain confined to the US but it seems that the CBA in developing countries have been the object of much less scrutiny and debate, making these devices generally unnecessary (for an example in Sri Lanka, see Molle & Renwick, 2005). Internal incentives in development banks have generated a pressure to lend⁷ which has fostered what has been called ‘irrigation optimism’ (Jones, 1995), as well as distorted economic analyses, as indicated by ex-post studies on irrigation investments which in a large majority of cases found a shortfall in internal rate of return (ADB, 1986, 1995; World Bank, 1986; Jones, 1995).

Regional Politics: Equity and/or the 'Grab-it-First' Strategy

Overbuilding of river basins is also often promoted by political and socio-economic concerns for poorer regions, which lag behind other parts of a country and display higher levels of poverty. Politicians from these regions are likely to stress that other areas with stronger comparative advantages (for example, in terms of soil, water or linkages with markets) have benefited from earlier priority investments, and that concern for equity or poverty alleviation demands similar investments to be extended to other regions. Such demands often gain strength when local politicians are associated with the ruling party and expect a reward for their support.

The state government may also be sympathetic to such demands when problems of migration affect the capital or the largest cities. Objectives of reducing urban marginality and poverty prompt large-scale rural projects to retain the local population and spur regional development.

When earlier investments have benefited areas located at the downstream extremity of a river basin (typically large fertile plains and deltas), upper regions claim that they have been discriminated against and that the river traversing their land is also 'theirs'. This leads to further development plans in sub-regions with sometimes only marginal land and to tap resources that are already partly appropriated by downstream users (Molle, 2003). Benefits are spread and equity enhanced but at the cost of basic economic principles, since late developments reduce the economic return of downstream facilities: benefits are merely shifted spatially and investments made redundant.

In addition, projects propelled by populist arguments are also frequently over-extended in order to distribute benefits to the largest number of people, thus maximizing political reward. Likewise, new dams constructed for flood control or for easing water shortages will almost invariably have their attendant irrigated areas because of the necessity to raise the project internal rate of return and offer compensation to the province which will support the consequences of flooding at the dam site. These processes contribute to increasing diversions and basin closure.

A variant of this situation can be found in federal states where this balancing between regions is harder to achieve. States sharing the same river basin and not depending on the centre's fund for construction will tend to rush to develop water resources before other states do. In the absence of sharing agreements (such as the pact between states in the US), or enforcement of these agreements, this 'blue rush' will fuel overdevelopment, with upstream states developing infrastructure to use water that is already (at least in part) used by downstream areas. Typical examples of such a situation can be found in the Krishna and Cauvery basins in India.

Low Risk, High Subsidies

Development of public irrigation schemes is highly subsidized. Only in a very few cases have irrigators paid a small portion of investment costs and, in most cases, cost-recovery does not even cover O&M costs. Such projects developed at the expense of the taxpayer are therefore much in 'demand' by local authorities and politicians, and sometimes local populations. Many economists argue that if users were made to pay the full costs (or to start with the full O&M costs) there would be much less 'demand' for them (Repetto, 1986).

Although it is clear that sunk costs of past projects will never be repaid (Garrido, 2002), a number of countries such as Turkey, Spain or Australia have tried to change the rules and make cost-sharing of future projects compulsory.

Since projects are funded with public money, possible failures carry less consequence than it would for private investors. This is paralleled with the fact that main international development banks face no sanction for failed or under-optimal projects, since they are assured to be reimbursed. As mentioned earlier, this has fostered what has been called a 'lending culture' which has also fuelled the design of projects with modest economic potential.

The Push Factor of Agrarian Pressure and Shock Events

The responses and behaviour of water users and society at large to water-related problems depend on their perception of the magnitude and seriousness of these problems. This perception, in turn, is often sharply influenced by extreme natural events, such as typhoons, droughts and floods, which are generally accompanied by food shortages, disasters and the disruption of livelihoods.

Shock events often allow governments to impose policies that would otherwise have been unpopular and opposed. Allan (1999) remarked that politicians are more likely to wait for the exhaustion of resources and the surge of crises before embarking on draconian reforms. Indeed, drought crises are often manufactured (Mehta, 2001) or used as compelling proof that the 'balance between supply and demand has been lost' and supply needs to be increased. Projects of interbasin transfers or reservoirs that have often been considered during earlier decades are rekindled. Water shortages in big cities create a psychological context where costly projects can be justified and launched.

Rural poverty can also be a strong driver of basin overdevelopment. Faced with prospects of famine or social unrest and secondary/tertiary sectors unable to absorb growing rural populations, governments have found themselves in a situation where the main way out has been massive investment in water and other rural infrastructures. The El Niño-related climatic perturbation of 1972, which severely affected grain production and sent prices rocketing, combined a climatic shock event with fear of rural disintegration. The psychological impact of this event, on both national decision makers and Western countries (engaged in the Cold War and bent on investing in countries potentially threatened by the spread of communism), was so high that much of the huge investments in dams and irrigation infrastructure that were to follow can be ascribed to the threat of food shortage in the particular geopolitical context of the time (Barker & Molle, 2004).

In such situations, economic or hydrologic rationality is neither here nor there and infrastructure is designed to benefit the larger number of people and is therefore often over-extended: this will increase the frequency and impact of forthcoming shortages. Large tracts of these projects will remain uncultivated, and the images of parched fields and cracked soils will hit the news and trigger calls for more water resources development.

Lopsided Governance and Weak Participation

A final reason why basin overbuilding occurs is due to the lack of openness in decision making and, in many cases, the absence of participation from segments of the population that are to be affected by the project, as well as the weak defense of environmental

integrity. It is commonplace that feasibility studies or environmental impact assessments are not made public. Presentation and discussion of alternatives, identification of probable impacts with concerned populations, distribution of costs and benefits, and compensation schemes, are examples of issues that are imperfectly considered, if at all.

Experts too often insulate themselves from public debate on the basis that issues are too complex or technical to be understood by the layman. By suggesting that arguments are merely technical they close and depoliticize the debate.

However, river basin development appears to be a political process where asymmetries of information do not facilitate informed and inclusive processes of decision making. The financial and political interests involved tend to push for a hasty completion of the project. These interest groups easily convince themselves that they work for the common good, but experience shows that losers tend to be overlooked first and then forgotten if they do not have political channels to make sure their rights are being taken into consideration. Since projects increasingly affect third parties and the environment as a basin closes, inadequate governance patterns tend to let the driving forces of basin overbuilding go unchecked.

Conclusions

Basin overbuilding and basin closure have occurred in many basins such as the Colorado, Yellow River, Amu-Daria/Syr-Daria, Jordan, Cauvery, and many rivers of Mexico, Iran, etc. Such processes seem to be on their way in the Ganges, Indus, Krishna, Nile and other river basins.⁸

The over-commitment of water resources in a given river basin may also be the result of uncoordinated and unchecked individual diversions of surface water or abstraction of groundwater. This paper has focused on large-scale irrigation schemes, reservoirs and other infrastructure built and managed by state agencies, but it is worth mentioning that basin closure can also be compounded, and sometimes driven, by the development of diffuse individual or small-scale irrigation. This is the case in the Krishna Basin and many Indian catchments where areas irrigated by wells and/or equipped with water harvesting structures have sometimes outstripped public irrigation areas (Venot *et al.*, 2007).

However, large-scale water resources development is the chief driver of closure of most basins: the drivers of the overbuilding of river basins lie in the planning and decision-making process, whereby water scarcity and crises are first generated by over-extended facilities and are then used to justify further storage or transfers. This self-sustaining vicious circle has led many basins to close, with a critical impact on ecosystems and increased vulnerability of users to variability in supply.

This draws attention to the artificial nature of water scarcity when generated by overbuilding of river basins. Discussing and designing new policies and projects in response to water problems are paramount; yet, it is equally important to comprehend how and why we got there. Decision-makers willing to avoid long-term environmental and socio-political disturbances should be increasingly aware of the mechanisms described above: stricter examination of planning hypotheses, evaluation of risk, and consideration of likely cost overruns coupled with greater transparency and public scrutiny may help discard the potentially most damaging projects.

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Notes

1. Climate change does increase climatic variability and affects hydrology, but the discussion here is focused on human-induced scarcity.
2. In the USA, it was only in 1993, in a landmark statement, that the Bureau of Reclamation publicly announced that “Federally-funded irrigation water supply projects [would] not be initiated in the future”, marking a dramatic end to its historical mission (Postel, 1999).
3. “Rent-seeking behavior is deeply embedded in the social and political fabric of all major irrigating countries and thus changes only slowly and usually because of major exogenous threats” (Briscoe, 1999).
4. The speech made by President Salinas during the inauguration of El Cuchillo Dam on 17 October 1994 was typical of the way politicians like to frame projects in terms of administrative state boundaries rather than hydrological boundaries, overlooking interactions that will, however, soon surface: Salinas declared that “El Cuchillo Dam is a project of Nuevo León and for Nuevo León, which will solve future water supply” (Barajas, 1999).
5. A striking example is that of the planned abstraction of an aquifer in the Mojave Desert, in California, where experts of the private company proposing the project put estimates of the recharge rate at ten times of that assessed by the US Geological Survey (Booth, 2002).
6. According to Reisner (1986, p. 5), irrigation development was “pursued with near fanaticism, until the most gigantic dams were being built on the most miniscule foundations of economic rationality and need”.
7. In 1992, the Wapenhans Commission found that ‘pressure to lend’ was undermining the rigour of appraisals and project quality.
8. With the ambitious plan to develop more irrigated areas in the North Sinai and southern Egypt, an additional 10 billion m³ of water in the Nile Basin will be extracted, i.e. almost 20% of Egypt’s internationally negotiated share of the annual storage releases from Lake Nasser (USAID, 2002). Flows to the northern lakes, which are already polluted and where fisheries are declining, are unlikely to receive water in adequate quantity and quality, and the intrusion of seawater into coastal groundwater will increase. Acute irrigation water shortages could also be expected for farms at the tail end of irrigation canals (USAID, 2002).

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