Evidence and Programming Entry Points

Water for Economic Development

ICED
Infrastructure & Cities for Economic Development

Introduction

This briefing note provides an overview of the potential opportunities for integrating water considerations into infrastructure and wider economic development programming. The brief explains the underlying theories of change that link water to economic growth, and provides examples of how water might be included in donor programmes. It also sets out practical considerations for design, appraisal and evaluation. It draws upon lessons from a recent ICED Transboundary Water study in South Asia, a subsequent DFID workshop to discuss water for economic development, and wider evidence on the costs and benefits of improved water management.[1]

Role of water in economic development

The availability and quality of water are important for a range of development sectors, including:

- *Energy:* Energy is a key input to other economic activities, including manufacturing and supporting the diversification away from agriculture. Water is a vital input for a range of energy production technologies. This includes the extraction, transport and processing of fossil fuels, as well as for cooling of thermal power plants. Water is an important input for the irrigation of biofuel crops which form a growing part of the energy mix. A lack of water availability can be a significant constraint to energy growth. The OECD estimates that 15% of freshwater withdrawals are currently for energy production purposes, with the IEA estimating that this will increase by 20% between 2010 and 2035, driven primarily by increases in biofuel production and thermal energy production (OECD 2016).
- *Agriculture:* Water is vitally important as an input for both rainfed and irrigated agriculture. Increasing demand for food (due to economic and population growth) will require greater water efficiency, particularly given the competing demands (urban, industrial) and climate change. Agriculture represents a significant source of employment in developing countries. For example, agriculture accounts for 65% of overall employment and 32% of GDP in Africa. It is estimated that between 1.2-1.5 billion rural households in Africa and Asia depend on groundwater withdrawal to support primarily agricultural livelihoods (DFID 2014).
- *Industrial development:* At the global level, industry only uses a small proportion of the water used by agriculture, but it needs consistent supplies of a reliable quality. Quality is more important for some sectors (e.g. precision manufacturing, electronics, food processing) whereas quantity is more important for others (e.g. textiles, leather). Data indicate that approximately 20% of the world's freshwater withdrawals are used by industry, but this is highly dependent on the region (UN-Water, 2013). Growth in demand for industrial water is expected to increase sharply. In OECD scenarios for 2000-2050, the overall demand is expected to increase by 400% which represents the most of any sector, with this demand primarily due to developing countries (OECD, 2012).
- *Urban development:* Urban development can support economic growth (through agglomeration effects) but is also is a key driver of water demand. This is driven both by the growing scale of urban population, but also by increased per capita water consumption. Urbanisation can also exacerbate the risks of flooding, particularly where drainage and storage are not considered and where impervious designs increase run off during heavy precipitation events. Higher asset and property values also result in larger economic losses during flood events. For example, the OECD projects that the value of assets at risk will grow by 340% between 2010-2050. Urban development also impacts negatively on water quality, with increased volumes of waste water and run off requiring collection and treatment. (OECD, 2012).

[1] For the recent DFID study – Transboundary Waters in South Asia - prepared by ICED, see http://icedfacility.org/wp-content/uploads/2019/05/A.GLO_.WAT_.02_South-Asia-Transboundary-Water_Report.pdf

- *Transport:* At a macro level, navigable rivers provide cheaper forms of transport for improved volumes and cost of internal or regional trade. This can be particularly true in areas where the road and rail networks are under-developed and navigable waterways often offer the only means of transporting freight between under-connected regions.
- *Eco-system services:* Poor water management can undermine the integrity of fresh-water eco-systems that underpin livelihoods associated with natural resource use. Ecosystems provide economic services (e.g. water purification) which otherwise would have to be replaced by costly man-made infrastructure.
- *Transboundary issues and conflict:* Water is also a significant transboundary issue, particularly where upstream use can impact upon the economic development and livelihoods in countries downstream. This can be in terms of over-extraction (leading to downstream deficits), landscape interventions (leading to downstream floods), and poor environmental management (leading to a reduction in downstream quality). This can act as a point of conflict and lead to regional instability, which in turn can have significant socio-economic impacts.

The effective use and management of water across these sectors can in turn support livelihoods, particularly of poor and marginalised communities, who are disproportionately affected. These groups are more likely to rely on rain-fed agriculture to feed their families, live on marginal lands more prone to floods, and are most at risk from contaminated water and inadequate sanitation.

Evidence base

There is a broad literature, which seeks to quantify the linkages between water and economic growth. Key insights include:

- *Water as an input to economic development:* The OECD projects that global water demand is likely to increase by 55% over the period to 2050 due to increases in demand for manufacturing (400%), electricity production (140%) and domestic uses (130%) (OECD 2016).
- *Economic dependence and exposure:* It is estimated that more than 10% of global GDP is currently concentrated in the world's ten most populous river basins, with this is likely to increase to 30% by 2050. At least seven of these basins already experience unsustainably high levels of water consumption relative to natural run off. This is likely to worsen with expected growth in water demand and the effects associated with climate change. (HSBC 2012).
- *Employment benefits:* While 1% of the global workforce work in the water sector, more than 1.4 billion jobs are heavily water-dependent and a further 1.2 billion moderately water-dependent, primarily in agriculture, energy and industry. Together, these constitute 78% of the global workforce (UNESCO 2016).
- *Macro-economic effects of improved WASH:* The global economic losses associated with inadequate water supply and sanitation are estimated at US$260 billion per year (World Bank 2016); Investment in small-scale projects providing access to safe water and basic sanitation in Africa could offer an estimated economic return of about US$28.4 billion a year, or nearly 5 % of gross domestic product (GDP) of the continent (UNESCO, 2016).
- *Economic Returns on WASH interventions:* The benefit-cost ratios of meeting SDG goals for access and sanitation across developing countries are estimated at 3.4:1 rising to 4.6:1 where universal access is achieved, with economic gains equivalent to between 1-2% of GDP and payback periods between 2-4 years (HSBC, 2012).
- *Avoided economic impacts of climate change:* Improved governance in water-stressed countries has the potential to mitigate the projected negative economic impacts of climate change by 2050 (estimated at a reduction in GDP of up to 6% due to losses in agriculture, property, health and income) and in some cases, increase economic output by an equivalent amount again due to improved efficiencies and better governance (World Bank 2016).

- *Reduced impacts of urban flood damage:* Improved water management has the potential to reduce the global economic losses associated with urban property flood damage, currently estimated at US$120 billion per year. The number of people at risk of floods is projected to rise from 1.2 billion to 1.6 billion between 2010 and 2050 as a result of climate change and poor planning (OECD 2016).

Barriers to investment in improved water governance

Investment in water security faces several barriers to increased investment in economic water infrastructure (see OECD 2016):

- *High capital costs:* Water infrastructure is typically capital intensive, long-lived with high sunk costs. It requires a high initial investment followed by a very long payback period. Such long lived assets require robust governance and market regimes to secure investment.
- *Mix of public and private benefits:* Investments in water security deliver a mix of public and private benefits to a range of users. As many of these cannot be monetised, the risk and returns are often not evenly distributed, undermining the potential investment case.
- *Politics of water:* There are often issues around affordability of water services and ability/willingness to pay by end users. The water sector is politically sensitive and subject to intervention/interference by local interests, which may lead to sub-optimal decision making.
- *Climate change:* Uncertainty around the impact of climate on the availability and predictability of water supplies and wider hydrology which can create risks for project development, potentially undermining the economic case for investment.
- *Policy fragmentation:* Consideration of water is often at the sectoral level, with a lack of joined up thinking around overall supply and demand considerations, and potential trade-offs between sectors (e.g. between urban development, agriculture and industrial use).
- *Decision making tools:* Water investments are a complex area, and investors often lack sufficient data and decision-making tools to understand the risks and opportunities associated with projects. A lack of track record in country is also a barrier.

Practical entry points in donor programming

There is a broad range of opportunities for mainstreaming water into wider economic development and sector programming, even if donor programmes would not have an explicit central focus on water. In terms of donor interventions, consideration might be given to exploring water in the context of the following types of programmes:

- *Urban economic development:* Integrating water (e.g. supply, quality, drainage, flood protection) in urban economic development planning to ensure that water acts as an engine of social and economic development, rather than a potential barrier.
- *Infrastructure:* Consider potential changes in water availability and stresses in terms of infrastructure design and provision (e.g. flood risk sizing), and consider nature-based approaches to as alternative to hard infrastructure where appropriate (i.e. green flood buffer zones).
- *Markets for the poor (M4P):* Explore how water can act as an input into economic development alongside other factors (e.g. power, land, transport) and facilitate access to new forms of water markets and technologies (e.g. efficient irrigation, water collection and storage, water services).
- *Climate smart agriculture (CSA):* Approaches are already available, such as Climate Smart Agriculture (CSA) or Sustainable Agricultural Intensification (SAI), that allow farms to maintain or even increase yields, while reducing their water footprint.
- *Governance:* Improved governance at the regional, national and sub-national level can feed through into better water management. This can include processes and systems for analysis and planning, allocation, conflict resolution and early warning for water related disaster risk.

Design considerations

Where water is a secondary or indirect consideration in programming (whether as a facilitating factor or a barrier to delivering economic development outcomes), it should nonetheless be considered explicitly as part of the programme design and delivery process in the following ways:

- *Political economy considerations:* Consider the political economy of water availability, including power structures around water resource allocation, potential trade-offs in access rights between users, and the role of water as a driver of resource conflict.
- *Economic appraisal:* Explore the costs and benefits of improved water availability and management, particularly in terms of its ability to result in increased economic activity (jobs, agricultural yields, manufacturing output, trade), or reduce economic costs (e.g. flood).
- *Monitoring and evaluation:* Review how water-relevant indicators might be included in the logframe, to include improved access and quality (e.g. number of beneficiaries, associated health outcomes), protection (e.g. ha) or efficiency (e.g. water use/output).
- *Climate and environment:* Consider the role of improved water governance or infrastructure might also help build resilience of livelihoods and economic infrastructure against a changing climate, whether due to increasing temperatures (e.g. the effects of higher trans-evaporation rates in agriculture), or greater variability of precipitation (e.g. floods, drought).
- *Social impacts:* Review the distributional effects of poor water management, governance or infrastructure, particularly on the most vulnerable populations (marginalised communities, children, women), and to what extent water underpins or acts as a multiplier for other causes of poverty, including considerations of ability to pay.
- *Sustainability:* Consider how water infrastructure services might be sustainably financed and managed over time, (e.g. tariffs for water and sanitation services, abstraction charges, pollution taxes, land value capture taxes, taxes on impervious surfaces, and urban flood plain development).
- *Value for money:* Review options to optimise existing infrastructure (e.g. O&M, demand management), explore VfM in sequencing of projects (infrastructure, institutions information), align interventions with other sector approaches where possible, and ensure appropriate charging/cost recovery for economic benefits accruing to private interests.

Areas for further research

There are several areas that would benefit from further research:

- *The economic benefits of improved larger scale water governance:* While there is a substantial body of literature around the economic benefits of individual WASH or agricultural irrigation interventions, the evidence is less robust on improved governance (e.g. larger scale policy, basin-level or transboundary water issues).
- *Exploring the distributional costs and benefits of water interventions:* Key to developing sustainable water sector interventions is an understanding of the distribution of costs and benefits of water sector interventions (which deliver both public and private goods), and then using this information to support investment and operating strategies for funding. Examples include land or asset value uplift, ‘polluter pays’ principles or user charging.
- *Understanding the acceptable levels of water risk from climate change:* While it is clear that climate change will have a fundamental impact on water availability it is less clear to what extent these risks should be mitigated and what might constitute an appropriate level of risk for end users in order not to over-invest in resilience.

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