Exploring the links between water and economic growth

A report prepared for HSBC by Frontier Economics: Executive Summary

June 2012

Issued by Corporate Sustainability,
HSBC Holdings plc, London

Designed by Creative Conduct Limited, London

frontier economics

Water Programme | HSBC

The water challenge

Population and economic growth are putting pressure on available fresh water resources worldwide. Uncertain water availability is a challenge that many countries face, which can impact economic growth. This 'water challenge', and its links to economic growth, has multiple dimensions, one of which is access to safe drinking water and basic sanitation services. Improved access has a direct positive impact on people and communities leading to significant social, economic and environmental benefits. This explains why a Millennium Development Goal (MDG) is ***"to reduce by half the proportion of people without sustainable access to safe drinking water and basic sanitation by 2015 compared with 1990 levels"***.

Water resource management at river basins is another key link between water and economic growth. Effective management of freshwater resources helps sustain agriculture, industries, ecosystems and communities.

This executive summary focuses on the new findings from the report regarding the links between these two dimensions, and economic growth.

Access to drinking water and basic sanitation

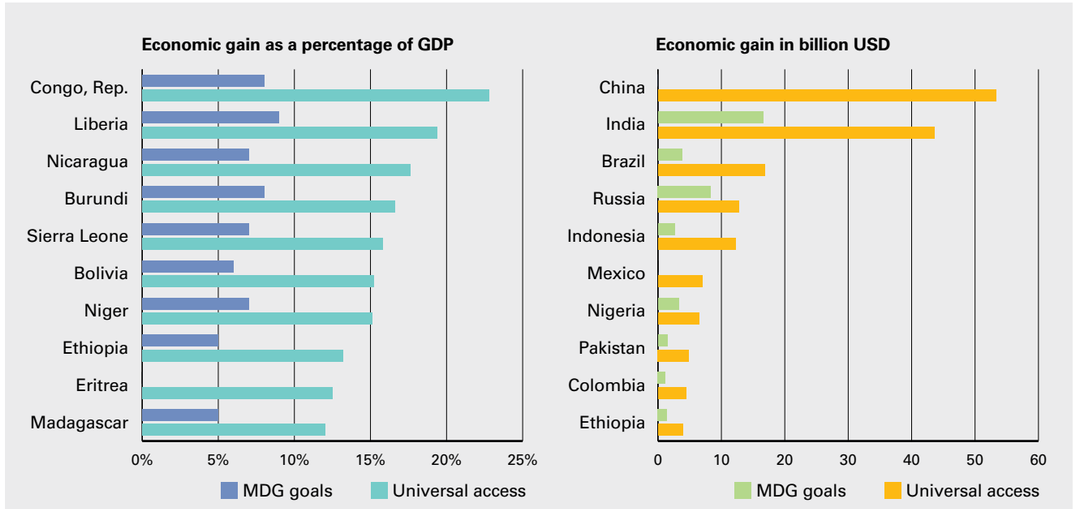
Benefits and costs

In 2010 almost 800 million people worldwide were without improved access to water and 2.5 billion people were without access to basic sanitation. Thus, the economic benefits from improved access to safe drinking water and sanitation can be considerable (see Figure below). Several developing countries in Africa and Latin America stand to gain the equivalent of 5% or more of their annual GDP as a result of reaching the MDG. This share trebles to an average of more than 15% of annual GDP if the target is expanded to universal access.

Likewise, the economic benefit of providing universal access to Brazil, Russia, India and China would amount to more than USD125 billion per annum, or about 1% of their joint 2010 GDP. Estimates for Brazil, India and China are shown in the table below.

Potential annual gains from improved access to water and sanitation

Source: Frontier Economics



Costs and benefits of achieving universal access in growing and fast growing markets

Source: Frontier Economics

	One-off investment requirements (million USD, 2010)		Annual potential economic gain		Benefit-cost ratio**	Payback period***
Country	Water	Sanitation	(million USD2010 pa)	% of GDP		(years)
Brazil	5,396	15,064	16,824	0.8%	18.6	1.2
India	64,070	242,835	43,556	5.2%	3.2	7.0
China	8,498	83,217	53,279	0.9%	5.9	1.7

** Until 2050 taking into account population growth*
***Including operations and maintenance costs but excluding the costs of population growth (static view)*
**** Investment requirements relative to annual economic gain*

Countries in southern Asia and sub-Saharan Africa stand to gain the most from achieving the MDG target (see table below). The benefit of achieving the MDG worldwide would amount to more than USD56 billion per annum in potential economic gains between now and 2015; while achieving universal access would generate over USD220 billion annually.

Achieving these potential economic benefits from access to water and sanitation comes at a cost. At least USD140 billion of capital investments (between 2010 and 2015) are required to achieve the MDG target with low cost technology (i.e. borehole for water access or septic tank for sanitation). High cost technology, by contrast implies a household connection for both sanitation and water where the water is at least partially treated for sanitation purposes. Installing more advanced facilities would require investments in excess of USD300 billion.

Providing universal access to water for all poorly-serviced populations worldwide will cost at least USD175 billion, assuming the use of low cost technologies. An additional USD550 billion would be required to provide universal access to sanitation services. Employing technologies such as piped water and sewage connections would more than double those capital costs. While the initial investments required are large, the lifetime of water and sanitation infrastructure of about 35 years, if properly maintained, ensures that the cumulated benefits from the investment pay off.

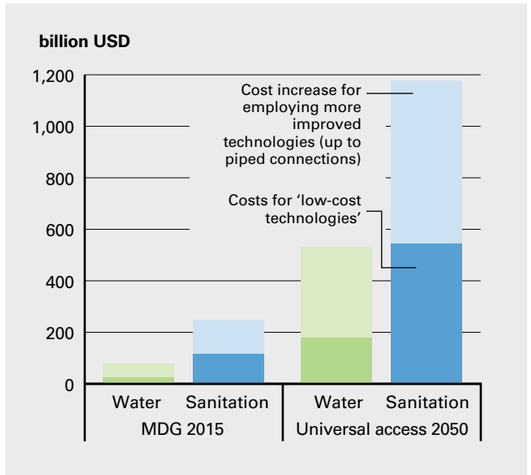
Absolute annual economic gains per region (in million USD2010)

Source: Frontier Economics

	MDG goals	Universal access
Sub-Saharan Africa	15,065	34,737
MENA countries	604	4,943
East Asia / Pacific	3,299	69,413
Southern Asia	20,245	55,468
Latin America	7,817	43,341
Eastern Europe / CIS	9,612	15,128

Capital cost range for improved access to water supply and sanitation

Source: Frontier Economics based on UN, WHO



Comparing benefits to costs, the return from every US dollar invested in improved access to water supply and sanitation differs considerably across regions (see table below). In Africa, the return is about 2 US dollars (per dollar invested). In South America, by contrast, such returns can be as high as 16 US dollars (per dollar invested). The table below shows the investment needs and potential economic gains in the six Asian and African countries where the HSBC Water Programme aims at improving access to water supply and sanitation.

Assuming low-cost technologies, achieving the MDG goals would require an investment of USD65 billion – 86 per cent for sanitation only, which illustrates the relative importance of sanitation improvements compared with water access improvements.

Costs and benefits of achieving MDG targets in HSBC Water Programme countries

Source: Frontier Economics

Country	One-off investment requirements (million USD2010)		Annual potential economic gain		Payback period*
	Water	Sanitation	(million USD 2010 pa)	(% of GDP)	(years)
Bangladesh	1,208	2,779	1,076	1.1%	3.7
India	4,338	36,911	16,550	1.0%	2.5
Nepal	142	896	389	3.0%	2.7
Pakistan	965	3,852	1,454	0.8%	3.3
Nigeria	2,248	10,086	3,318	1.7%	3.7
Ghana	125	1,525	556	1.8%	3.0

**Investment requirements relative to annual economic gain*

Benefit-cost ratio of implementing the MDG and universal access

Source: Frontier Economics[1]

	MDG goals	Universal access
Sub-Saharan Africa	2.3	2.5
MENA countries	1.8	4.2
East Asia / Pacific	3.9	5.8
Southern Asia	2.6	3.1
Latin America	14.9	16.4
Eastern Europe / CIS	12.9	11.6
Total average	**3.4**	**4.6**

1 Based on the assumption that access and sanitation technologies are 50% low cost and 50% high cost. Includes maintenance costs. Technical lifetime of water and sanitation investments of 35 years.

Water resource management (WRM)

The relevance of river basins
In 2010 the ten most populated river basins in the world were home to more than a quarter of the world population (see table below). While nine of these basins are in growing and fast growing markets, a conservative estimate indicates that in 2010 they generated almost 10% of global GDP. Based on current GDP and population growth forecasts, almost a quarter of global GDP could be generated in the ten most populated river basins by 2050.

By 2050, GDP in these basins is expected to be as large as the economies of the United States, Japan and Germany combined.

River basin sustainability
A 'blue water footprint' estimates the volume of water consumed from ground- and surface water flows. As a measure of water use, blue water footprint is more accurate than water withdrawals since a large percentage of water withdrawals typically return to local rivers and aquifers becoming available for reuse (e.g. 40% in the case of agriculture) (Hoeskstra et al. 2012). If the blue water footprint in a river basin is between 30 and 40% of natural run-off, water scarcity is considered to be *significant*; while if the water footprint exceeds 40% of natural run-off, water scarcity is considered to be *severe*.

Assuming that the blue water footprint grows in line with population and there are no improvements in water efficiency or water resource management, by 2050 water scarcity could be significant or severe in seven of the ten most populated river basins (see page 7).

If management of scarce water in these basins is not improved, the growth in GDP expected in these basins may not materialise. In addition, the ecosystems which are home to nearly one quarter of the global population could be permanently damaged.

World GDP share of ten most populated river basins

Source: Frontier Economics based on data from World Bank and HSBC (GDP); United Nations and Water Footprint Network (population)

			Population in 2010		Basin GDP in 2010		Basin GDP in 2050	
No.	**River**	**Country/Region**	**(million)**	**(%world)**	**(billion USD)**	**(%world)**	**(billion USD)**	**(%world)**
1	Ganges	India, Bangladesh, Nepal	528	7.7%	690	1.1%	5,776	3.0%
2	Yangtze (Chang Jiang)	China	407	5.9%	1,796	2.9%	14,810	7.8%
3	Indus	India, China, Pakistan	254	3.7%	281	0.5%	1,522	0.8%
4	Nile	Northeastern Africa*	207	3.0%	304	0.5%	3,035	1.6%
5	Huang He (Yellow River)	China	170	2.5%	751	1.2%	6,187	3.3%
6	Huai He	China	103	1.5%	457	0.7%	3,766	2.0%
7	Niger	West Africa**	100	1.4%	105	0.2%	753	0.4%
8	Hai	China	96	1.4%	426	0.7%	3,511	1.9%
9	Krishna	India	89	1.3%	126	0.2%	1,052	0.6%
10	Danube	Central & Eastern Europe***	81	1.2%	1,305	2.1%	6,432	3.4%
	Total		**2,035**	**29.5%**	**6,241**	**10.1%**	**46,844**	**24.7%**

** Burundi, Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, Uganda*
*** Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Guinea, Mali, Niger, Nigeria*
**** Austria, Bosnia and Herzegovina, Bulgaria, Germany, Hungary, Romania, Serbia, Slovakia, Ukraine*

Addressing the Water Challenge

Competing demands for water and freshwater resources are increasing over time, due to population and economic growth. This water challenge is the subject of attention of many stakeholders worldwide, from governments and international organisations, to multinationals, environmental groups, academia and NGOs.

The 'water challenge' is multidimensional. Addressing the challenge will require improvements not only to populations' access to fresh drinking water and basic sanitation services – a basic human right - and improvements in the way we manage available fresh water resources in river basins; but also how efficiently and effectively we use freshwater resources in agriculture, industry, and household use; how we dispose of it after use (wastewater treatment and related pollution); how we finance the investments required to improve water productivity; and the interdependencies between water, food, energy and climate change; how we manage the risks and uncertainties inherent to the sector, and the potential for policy reform induced by increasing water scarcity.

1 *Hoekstra, A.Y. and Mekonnen, M.M. (2011) Global water scarcity: monthly blue water footprint compared to blue water availability for the world's major river basins, Value of Water Research Report Series No.53, UNESCO-IHE*

2 *Hoekstra AY, Mekonnen MM, Chapagain AK, Mathews RE, Richter BD (2012) Global Monthly Water Scarcity: Blue Water Footprints versus Blue Water Availability.PLoS ONE 7(2): e32688. doi:10.1371/journal.pone.0032688*

Blue water consumption in ten most populated river basins

Source: Frontier Economics using average monthly blue water footprint data reported in Hoekstra and Mekonnen (2011)[1] and Hoekstra et al. (2012)[2]