

The past, present and future of finance for investment in water systems

By

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1. Introduction and summary

For the last 20 years, the orthodox paradigm for financing water and sanitation in developing countries has treated the state as having inadequate capacity to either finance or operate water and sanitation services. It has instead promoted the primacy of private direct financing of investment, and the market model, with pricing mechanisms providing incentives and signals for investments, supported by targeted aid designed to 'leverage' the maximum amount of commercial investment. In recent years, it has become apparent that these approaches have not succeeded in generating a flow of investment adequate to meet developmental needs.

This paper examines whether this paradigm is both empirically and conceptually flawed. It presents empirical evidence on the historical relative use of public and private finance for investment in water and sanitation systems in developed countries, evidence on the relative use of public and private finance and aid in developing countries, and evidence on the likely impact of the economic crisis. It presents an analysis of the affordability of investment in water and sanitation systems for developing countries, and specifically investment in household connections.

In conclusion, it discusses the gap between the official paradigm and observed reality of water and sanitation systems, and identifies two models – the donor model, and the national model - with conflicting positions on four key aspects – source of finance, type of operator, 'improved' source or household connection, and leading role of donors or countries. The national model is in reality driving developments in the sector, and also reflects a new southern view on development.

2. Water finance in high income countries

The great majority of investment in water and sanitation services in high income countries has been carried out by the public sector using public finance raised through taxation, or loans raised on the security of this flow of taxation.

During the 19th century, water utilities were created or taken over by municipalities in nearly all European countries, including the UK. This was linked to the growth of municipal socialism (or 'gas and water socialism'), which drove the development of local public services in Europe. This ideology saw the public sector as a mechanism to fulfil a set of economic and political objectives - economic development, public health and improvement of social conditions for the urban poor. The municipalities developed financial mechanisms superior to the private sector, including borrowing long-term money from local savers, at low interest rates because of the security of their flow of income from taxes.¹

If anything, the process of municipalisation was even more rapid in the USA than in Europe: by 1897, 82% of the largest cities were served by municipal operations. Municipalisation was seen as a way to overcome the systemic inefficiencies of the private contractors: "During the 19th century, the previously private systems came under public ownership and public provision because of the inefficiency, costs and corruption connected to them... Democratically elected city councils bought existing utilities and transport systems and set up new ones of their own. This resulted in more effective control, higher employment, and greater benefits to the local people. Councils also gained the right to borrow money to invest in the development of their own systems".²

In some countries, water charges continue to be collected through property taxes rather than metered payments - in the UK the majority of households continue to pay annual charges based on the value of their property, rather than metered consumption of water. Water services in the UK were provided by municipalities until 1974 and then by state-owned regional authorities until 1989. Virtually 100% connection of urban population had been achieved well before that date: the privatised water companies of England have, historically, contributed little to the extension of urban water supply systems in England or Wales (still less in Scotland and Northern Ireland, where the systems remain public).

In France, almost uniquely, the private companies have survived from the 19th century and evolved in the process. During the the 19th century when the dominant system was private concessions, there was very little

growth in connections to the network. The municipalities found it was not legally possible to force concession companies to extend the network as public policy required, and therefore introduced municipal companies (“régies”) as the vehicle for investment and operation. Virtually all the growth in extension of the network took place under this form during the first 70 years of the 20th century. This included major extensions in rural areas following the Second World War, paid for by the urban population, a massive cross-subsidy only possible as an act of public policy. From the 1970s, delegation to the private sector grew again to become the dominant mode, but this time typically under “affermage” lease contracts, under which responsibility for investments remained with the municipalities. Thus even in France the extension of the system was carried out by and through municipalities, not through private operators.

Despite the dominant role of municipalities, central governments have played a significant role in financing water systems. This has sometimes involved paying directly for the water supply service, so that there is virtually no role for charges (e.g., Ireland); distributing some part of central tax revenue to support local authority spending on water and other services (e.g., Canada); providing cheap loan finance for local authorities to use for capital investment (e.g., USA); or collecting part of water charges centrally and redistributing it to authorities which need to invest (e.g., France). In Europe, the EU itself plays a major role in public financing of water systems in poorer states through the cohesion and solidarity funds, and through low interest loans from its public sector development instrument, the European Investment Bank.

In many cases, user charges still include what are effectively ear-marked or hypothecated taxes rather than charges related to consumption, even under largely privatised systems. The charges levied by the private water companies in England and Wales are still based on a single annual payment based on the value of the property (as specified in a tax base which is now obsolete for local government purposes). In Hungary, despite privatisation of water in most major cities, tax revenues of central government continue to be the main source for financing investment in infrastructure. In France, “funding for water services is still overwhelmingly public, and private funding accounts for only 12% of the investment” (Pezon, 2009 p.198). While it remains possible for people to hypothesise or imagine that such private water companies might be vehicles for investment to extend water systems, there is no historical record of this happening – not even in France or the UK.

Table 1. Finance for drinking water and sewerage services in France 2006

	€millions	Percentage
Agents	576	12
Local authorities – service budget	2370	49.4
Local authorities – general budget	141	2.9
Water agencies	1161	24.0
Départements	367	7.6
State	121	2.5
Regions	64	1.3
TOTAL all sources	4800	100

Source: Pezon (2009) ³

In Europe, the use of taxation to finance water infrastructure is now institutionalised at European level through the EU cohesion funds. The EU collects about €20 Euros in taxes from every person in the EU each year to support investment in water and sanitation through these funds, and they remain an important source of finance for investments in central and eastern Europe, as they were in southern Europe during the 1980s and 1990, where the impact was substantial: in Portugal, for example, the population connected to piped water supply rose from 61% in 1989 to 95% in 1999. ⁴

Public finance played the same central role in developing water and sanitation systems in Japan, and in North America. Investment in large-scale capture and storage of water, and flood management, is also carried out overwhelmingly by public investment. Japan’s flood management programme continues to attract €9billion investment from public funds each year. These infrastructure projects have also been key elements in nation-building and economic development: “The United States has invested trillions of dollars in hydraulic infrastructure. While these investments have been recognized as crucial to promoting growth, many of the largest federal investments in US history were made to curb the destructive effects of water, particularly in

response to devastating floods. The nation's founders saw investments in water development as a way to bring the nation together". Indeed, the USA uses part of its military, the US Army Corps of Engineers, to carry out and manage much of this investment. (Grey and Sadoff, 2007)⁵

The history of water and sanitation in Toronto, Canada, illustrates a typical developmental path. In the early 1870s the growing city suffered from cholera and typhoid due to inadequate sanitation, and the city council, despite an economic recession, not only municipalised the water service, it installed new sewers and made sewerage connections compulsory, for public health reasons, whether householders asked for it or not, financed by the municipality. The benefits were immense: "This unprecedented power...led to tremendous sewer development in the 1880's....The effects of the typhoid fever epidemic were greatly reduced by the presence of a complete, clean sewage system. At the beginning of the 20th century, most of the streets in the city had been serviced and the operational costs were met through direct taxation."⁶ The same approach was then taken up across the province of Ontario, where public water systems grew rapidly by the turn of the century. The Public Health Act 1912 enshrined the Toronto principles of public finance and compulsory connection, by giving the provincial board of health the right not only to decide when a water or sewerage system was necessary "in the interest of the public health", but also to require local councils to finance it.⁷ The water and sanitation system of Toronto has continued to be publicly run and financed. As a proportion of the household incomes of Toronto, there is a long-term downward trend, after the peaks in expenditure which were temporarily necessary to construct a comprehensive network. .⁸

2.1. General economic advantage of public finance

There are clear economic reasons why public spending has been the preferred method of financing water infrastructure, which are demonstrated in Massarutto's analysis of the Italian water sector (Massarutto et al 2008).⁹

Firstly, the state can finance construction directly from tax revenues, in which case the cost of capital is zero; if it chooses to borrow, as a way of shifting some costs onto future taxpayers, it can do so more cheaply than the private sector, because of the superior security of tax revenues. Private investors not only have to pay higher interest rates, but also face the risk of being unable to secure long-term returns on sunk investments.

Capital costs represent 75% or more of total costs, and so the lower cost of public finance is decisive. The difference in the capital cost between public and private is as large as the *total* operational cost, in Massarutto's study of Italy. It is therefore impossible for the private sector to offset higher capital costs by comparative savings in operational efficiency (and the cumulative evidence of numerous studies is that the private sector does not, in any case, have any systematic advantage in terms of operating efficiency).¹⁰

Massarutto's paper also shows a second reason why public finance is needed. Household payments for a service based on full cost recovery by private investors, would represent 3.8-5.0% of income for low income households, even in relatively rich regions of a high income country such as Italy. A true consumer market would result in far less than 100% coverage, and commercial operators would not offer to provide service to customers whose ability to pay a high fixed cost is unreliable.

A third reason is pointed out by Gunter and Fink (2010): the health benefits of water and sewerage connections are social rather than private, and so the willingness of individual consumers to spend on these services will be below the socially optimal level. For the social benefit to be realised, connection must be compulsory, not optional – as illustrated by the case of Toronto (above).

3. Financing water and sanitation services in developing countries

Since 1990, the central model promoted by the World Bank and other international agencies has been of the private water company investing, developing and operating water and sanitation services in middle and low income countries. It is now generally agreed that this experiment has failed to generate significant amounts of private investment, and that there has been almost universal public resistance to private companies. A World Bank research paper in 2006, reviewing actual private investment in infrastructure in developing countries between 1983 and 2004, concluded:

"PPI [private participation in infrastructure] has disappointed - playing a far less significant role in financing infrastructure in cities than was hoped for, and which might be expected given the

attention it has received and continues to receive in strategies to mobilize financing for infrastructure...”¹¹¹²

3.1. Financing water and sanitation infrastructure in Africa

The World Bank-AFD 2010 report on ‘Africa’s Infrastructure’ provides data on the relative contribution of different sources of finance to the provision of water and sanitation services. These sources are: public sector, aid from OECD countries (ODA), aid from non-OECD countries (such as China), and the private sector (PPI, or private participation in infrastructure). Data is based on averages for the years 2001-2006.¹³

All operational expenditure is financed through the public sector. For capital expenditure alone, aid is more important than public spending. Aid from OECD countries, at about \$1.23billion per year, is about 15% greater than the public sector finance. Aid from non-OECD countries, such as China, is much smaller. The overall totals show that about 80% of all finance (excluding household spending, see below) comes through the public sector

In low income countries, the contribution of aid to capital investment is about three times as great as the public sector. The public sector is more important in middle income countries, and most of all in resource rich countries, where its contribution is three times greater than aid. In all countries, the contribution of non-OECD aid is smaller than either OECD aid or the public sector, though it is many times larger than the contribution of the private sector. It is relatively largest in resource rich countries, reflecting the preference of southern donors for focussing aid on these countries. **In all groups of countries, and in sub-Saharan Africa as a whole, the private sector contribution is close to zero.**

The table 1 includes an additional figure of \$2.13billion per year of ‘household self-finance’. This represents a very rough estimate of spending by private households on sanitation, derived from household survey data. It is very doubtful whether private spending on household toilets should be classified as infrastructure spending, and household spending is a different category from corporate investment. It is probable that the figure is included in order to boost the apparent contribution of the ‘private’ sector, and it is certainly highly misleading to combine it with the PPI data, as one of the figures in the report does.¹

Table 2. Financial flows to water and sanitation in sub-Saharan Africa

Source: Africa’s Infrastructure http://www.infrastructureafrica.org/aicd/system/files/AIATT_Consolidated_smaller.pdf

Table 16.6 Existing Financial Flows to Water Supply and Sanitation
\$ billions annually

Country type	O&M	Capital expenditure					Total	Total
	Public sector	Public sector	ODA	Non-OECD financiers	PPI	Household self-finance		
Sub-Saharan Africa	3.06	1.06	1.23	0.16	0.01	2.13	4.58	7.64
Low-income fragile	0.13	0.03	0.11	0.02	0.00	0.16	0.32	0.45
Low-income nonfragile	0.30	0.25	0.78	0.05	0.00	0.45	1.54	1.83
Middle income	2.17	0.15	0.10	0.01	0.00	0.21	0.47	2.64
Resource rich	0.15	0.72	0.24	0.08	0.01	0.52	1.57	1.72

Source: Briceño-Garmendia, Smits, and Foster 2008.

Note: ODA = official development assistance; OECD = Organisation for Economic Co-operation and Development; O&M = operation and maintenance; PPI = private participation in infrastructure.

The report also covers other sectors, including energy, transport and communications. Three general findings were that finance is predominantly African, not external; public, not private (except in telecoms); and through central government, not local.

¹ See p.329: “No reliable data exist on sanitation expenditures because individual households undertake so much of the expense. However, recent investment can be estimated from household surveys”. These estimates of household spending are shown separately in table 16.6. However, in table 0.4 of the report, this estimate is combined with the \$0.01billion attributable to PPI, under the generic heading ‘private’. In figure 2.1, this combined figure is presented in bar-charts as attributable to ‘private participation in infrastructure’, which is an error.

http://www.infrastructureafrica.org/aicd/system/files/AIATT_Consolidated_smaller.pdf

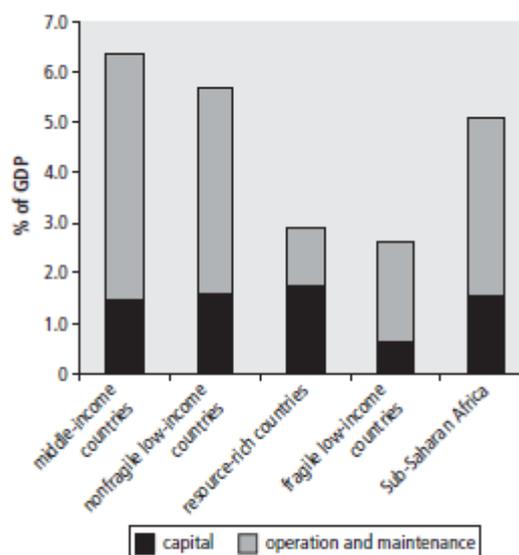
Overall, it noted that in general “spending on infrastructure in Africa is higher than previously thought, amounting to \$45 billion per year” (World Bank/AFD 2010 p.8) Most of it is paid for by Africans: “two-thirds of this overall spending is domestically sourced: \$30 billion of annual spending is financed by the African taxpayer and infrastructure user, and a further \$15 billion is from external sources” (World Bank/AFD 2010 p.8). Thus external aid and FDI supplement, rather than dominate.

It also notes that “The public sector remains the dominant source of finance for water, energy, and transport in all but the fragile states” (World Bank/AFD 2010 p.8). **The private sector makes no significant contribution to infrastructure investment in Africa except in telecoms.**

It further notes that “Public investment is largely tax financed and executed through central government budgets, whereas the operating and maintenance expenditure is largely financed from user charges and executed through state owned enterprises.” (World Bank/AFD 2010 p.8) Thus the key channels of public finance are through central government and the public sector – in contrast to the model at the centre of the OECD/World Bank approach, which focuses on municipal finance and private sector operators.

Chart A. Public spending on infrastructure in Africa as % of GDP

Figure 0.4 Infrastructure Public Spending as a Percentage of GDP



Source: Briceño-Garmendia, Smits, and Foster 2008.

Source: Africa's Infrastructure

http://www.infrastructureafrica.org/aicd/system/files/AIATT_Consolidated_smaller.pdf

3.2. Investment in south Asia

There is no comparable recent study on financing of infrastructure in south Asia. Another World Bank study in 2006 estimated that investments in infrastructure were about 12% financed by the private sector and 88% by the public sector. This was estimated by valuing changes in infrastructure stocks, and netting out the portion that was financed by the private sector, giving estimates of around US\$24.4 billion per year in public investment and US\$3.2 billion in private investment.¹⁴

The plans of the Indian government for the current period include conventional rhetoric about the importance of public-private partnerships, but expect a very low contribution from the private sector. Over 90% of the plan is to be financed by central and state governments and national financial institutions, with only 8% funded by aid and only 1.5% from the private sector.

Table 3. Financing of water and sanitation plans of India, 2007-2012

Currency converted at R40=\$1

Financed by	R crore	\$US billion	%
Central government	70,000	17.50	55
State governments	35,000	8.75	28
National banks	10,000	2.50	8
Aid	10,000	2.50	8
FDI/private sector	2,025	0.50	1.5
Total	1,27,025	31.75	100

Source: Planning Commission of India¹⁵

3.3. Difference from usual estimates

This distribution differs from that generally used in global discussions of water finance. These typically assume a much larger role for the private sector – local and international – e.g., 22% in the graphic below from Jimenez et al (IJWRD 2009).

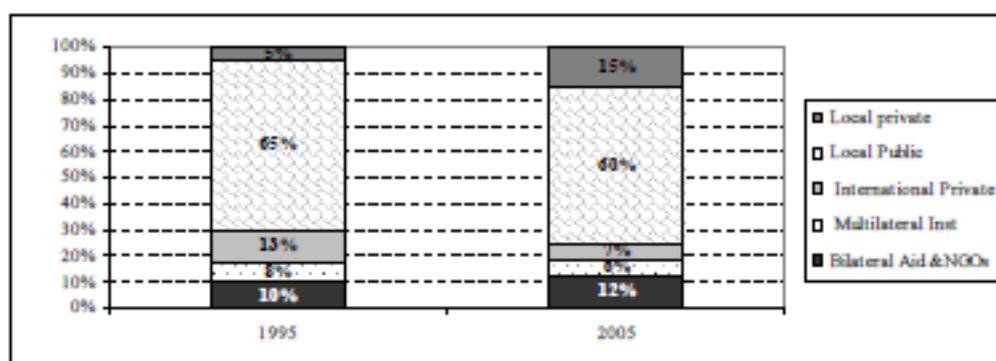


Figure 1. Estimation of water sector financing in developing countries. Comparison between 1995 and 2005. Source: Own elaboration from collected data (cited in main text).

Before the promotion of the private sector began in the 1990s, public sector investment in developing countries used to be at a much higher level. During the 1990s this dropped sharply: in Latin America, public sector investment in infrastructure dropped from 3% of GDP to 0.8%. A World Bank study concluded that the promotion of privatisation was itself a causal factor: “Ultimately, many of the adjustments in public financing and ODA largely reflect the fact that the expectations of private sector participation in the financing of infrastructure needs were overoptimistic.” Moreover, private sector investments were heavily skewed away from the areas of greatest need – Africa and South Asia – and in sectors other than water: the bulk of private investment went to energy and telecoms in Latin America, East Asia and Eastern Europe.¹⁶

4. The effects of the crisis

4.1. Economic crisis, fiscal stimulus, economic growth and aid

The crisis has done much less damage to African economies than it has to northern countries. The region as a whole did not even experience a contraction in 2009, when GDP growth overall was 2%; the IMF forecasts that in 2010 there will be growth of 4.7%, and in 2011 growth of 6% in GDP.

This is partly due to the use of fiscal stimulus packages, which included increased plans for public infrastructure spending, and have been strongly praised by the IFIs: “stimulus packages have been managed successfully without major impact on debt, and have increased the scale of public investment in infrastructure and the credibility of public spending on infrastructure”.¹⁷ There is no pressure from the World Bank or the IMF to make cuts to reduce these deficits, unlike the situation in Europe. The World

Bank's Global Economic Prospects 2010 says: "The need to unwind stimulus measures among developing countries is generally less pressing; because both fiscal deficits and debt-to-GDP ratios are much lower".¹⁸

This is despite the fact that the stimulus packages were large: public spending plans were increased by 5% of GDP above the average level of the 2003-2007 period, with higher levels of spending on health and education in low income countries, even in 2009.¹⁹

African governments are also confidently planning to finance their deficits by borrowing, including issuing bonds. Both Kenya and Tanzania plan to issue €500million bonds in Euros, Uganda plans a similar issue aimed at national rather than international investors. This policy is supported by a longer-term trend since 2000 for developing country governments being able to borrow money more cheaply, compared with rich countries. According to an IMF study, the spreads and effective interest rates paid by these governments has fallen in the last decade, so the cost of borrowing is lower.²⁰

The OECD expects public spending as a percentage of GDP to increase across Africa as a whole until 2011, before falling back, but still to a level above that of 2008 (see table). Because all international agencies forecast continuing GDP growth of over 4% per annum for Africa, the forecast still implies that actual public spending levels will be significantly higher – about 10% higher in 2011 than in 2008, in real terms.

Table 4. Public spending as % of GDP in Africa 2008-2011

	2008	2009	2010	2011
Africa	30	32.8	33	31.6

Source: African Economic Outlook 2010 <http://www.africaneconomicoutlook.org/en/data-statistics/>

4.2. Aid trends: OECD and non-OECD

The trend in aid spending by OECD donors depends on the outcome of policy decisions on public spending cuts as part of an 'exit' strategy from the stimulus packages of the OECD countries. So far, OECD figures show continuing growth in aid from donors in 2009, despite the financial crisis. Total aid from OECD country donors rose 0.7% in real terms, but by 6.8% net of debt relief, a volatile item which fell sharply during the year. The OECD forecasts that in 2010 OECD countries will not meet the levels of aid expected following the Gleneagles pledges, but will still rise by nearly 5% in real terms. Although there will not be a fall, the failure to meet the Gleneagles targets will have a significant negative impact in Africa: "Africa is likely to receive only about USD 11 billion of the USD 25 billion increase envisaged at Gleneagles, due mainly to some European donors who give large shares of their official development assistance (ODA) to Africa not meeting their ambitious targets."²¹

In the water sector, multilaterals aid has grown much faster than aid from donor countries in recent years. Between 2006 and 2008 multilateral spending grew by 68% to \$864million, greater than the total of aid from DAC countries.²² Sectoral data is not available later than 2008, but the World Bank has increased its overall spending commitments significantly since 2008. In 2009/10, the total amount committed was USD\$72.2, an increase of 23% over the previous year.

Table 5. Aid by OECD donor countries to sub-Saharan Africa - water, 2008 (\$millions)

Aid disbursements, sub-saharan Africa, water supply and sanitation (sector 1.4)	OECD donor countries	Multilateral banks	Total
2008	738	864	1602
2007	589.38	734.74	1324.12
2006	549.96	515.17	1065.13

Source : OECD <http://www.oecd.org/dac/stats/idsonline>

Non-OECD aid is concentrated on countries with natural resources. Thus the main beneficiaries of Chinese infrastructure finance to the sub-region are Nigeria (34 per cent), Angola (20 per cent), Ethiopia (10 per cent)

and Sudan (8 per cent). China's aid is focussed on infrastructure, although water is a relatively small element: "about 54 per cent of China's support to Africa over the period 2002–2007 was in infrastructure and public works. It is estimated that Chinese infrastructure finance commitments rose from \$470 million in 2001 to \$4.5 billion in 2007. With regard to sectoral distribution, 33 per cent of Chinese infrastructure finance to sub-Saharan Africa over the period 2001–2007 went to electricity, 33 per cent to transport, 17 per cent to ICT, 14 per cent to general projects and 2 per cent to water."²³ Thus China's aid to water in Africa is around £90million per annum. This confirms the findings of the Africa infrastructure review: **Chinese aid to water in Africa is eight times greater than the contribution of the world's private sector.**

An UNCTAD report does not expect the crisis to necessarily have a negative effect on aid from non-OECD countries: "For example, since the onset of the crisis, China has stepped up rather than reduced its economic engagement in African countries. In particular, it has promised to increase support to Africa. Brazil, India and the Republic of Korea have also signalled their intention to provide more support to the region in the coming years. Although the financial and economic crisis poses challenges for Africa–South cooperation, it also presents opportunities for Africa and could have a positive effect on Southern support to the region through two channels. First, to the extent that it has reduced growth prospects, it may create an incentive for Southern partners to pay more attention to the effectiveness of their support and so maximize its development impact in the region. Second, the crisis could also increase Southern solidarity and the need to enhance economic and development cooperation as a mechanism for weathering the impact of the global slowdown in developing countries."²⁴

Chart B. Non-OECD aid to Africa, 2006

	\$ millions	Source and remarks
Republic of Korea	47.8	OECD database
Turkey	24.9	OECD database
Arab countries (Kuwait, Saudi Arabia and the United Arab Emirates)	290.2	OECD database
China	2 300	Wang and Bio-Tchane (2008) and Besada et al. (2008). Figure includes debt relief, which was \$1.3 billion in 2006.
India	11.3	Based on United Nations (2008), India's aid for 2006 was between \$504 million and \$1 billion. To obtain the reported figure, we took a simple average of the United Nations estimates multiplied by Africa's share, estimated to be 1.5 per cent in 2006.
Brazil	96.1	United Nations (2008) suggests that Brazil's total ODA for 2006 was \$356 million. The figure reported here is based on information that about 27 per cent of its ODA goes to Africa (Kragelund, 2008).
Total	2 770.3	

Source: UNCTAD.

Source: UNCTAD 2010²⁵

5. Costs and affordability

5.1. Costs and benefits

The starting point for any question of affordability is costs. The table below shows the most recent comprehensive costings published by the World Health Organisation (WHO) for developing countries. The table shows that the cost of full household connections is roughly double the cost of basic 'improved' connections. Using the costs for full household connections, the table shows that all developing countries could achieve MDG levels of coverage using full household connections for both water and sewerage for a cost of \$35 billion per year over 10 years.

Table 6. Costs of meeting MDGs plus urban sewerage connections

Urban and rural. US\$billion, 2005 prices	Total costs to achieve MDG targets	Average annual cost over 10 years
	Water and sanitation	Water and sanitation
WHO base case: low-cost improvements		
<i>Costs of new coverage inc O&M</i>	184	18
Extra cost of household connections: \$bn.	143	15
<i>Total costs of new coverage inc O&M</i>	327	33
Extra cost of PSIRU urban sewerage target	22	2
<i>Total costs of coverage inc O&M</i>	349	35

Source: WHO 2008, PSIRU calculations

The next step is to assess whether the overall economic benefit from these investments is larger than the costs. This is standardly done by measuring the overall economic gains and health benefits of having water and sanitation systems, as a ratio of the costs of developing them. For example, the overall WHO cost-benefit analyses of water and sewerage investments, even in this most expensive form of household connections, are all positive, most of all in Africa and south Asia. In this sense, countries cannot afford *not* to make these investments - a country which does not do so would be worse off overall. The WSP now estimates that in India the health and economic damage of inadequate sanitation is equivalent to 6.4% of GDP, six times the estimated cost of dealing with it. The WSP adds that making this investment: “will also result in a huge economic benefit in terms of a large sanitation market”.²⁶

Table 7. Positive cost-benefit ratios

Region	Pop. m.	Benefit/costs		Source
Africa	481	4.8 x	full household connections	Hutton and Haller 2004
South Asia	1689	2.9 x	full household connections	Hutton and Haller 2004
East and southeast Asia	1488	1.9 x	full household connections	Hutton and Haller 2004
India		6.2x	sanitation	WSP ESI 2010

Source: Hutton and Haller 2004

Most of these benefits come in the form of externalities, however, and realised over a longer time period, so that they are not enjoyed by the investor, but by society and the economy in general. A 2009 private sector report by McKinsey on global water economics analyses investment requirements in the water sector, and identifies agricultural schemes and industrial efficiency schemes as areas where there may be sufficient short-term returns for private investment. Water supply to households is in a different category:

“...in many cases the measures with long payback periods—many of them supply infrastructure—are also the most capital intensive ones. This likely indicates that those measures will not attract private sector capital, requiring the financial burden to fall fully on the public sector”.²⁷

Some commercial investment and activities may also have detrimental effects on overall welfare. For example, manufacturers of commercial drinks may invest in promotions which effectively encourage the purchase of sweetened drinks rather than plain water and thus have a damaging effect on public health. Coca-Cola has been reprimanded for this in the UK, where it showed a television advertisement with the slogan ‘for people who don’t like water’. The advertising standards authority upheld complaints: “the overriding theme of the ad was the characters rejection of water... we concluded that the ad was irresponsible and could discourage good dietary practice”.²⁸ Commercial bottled water is an economically inefficient and environmentally harmful way of distributing water. The inefficient form of transport makes it far more expensive per litre to consumers, as well as generating plastic waste and consuming large amounts of energy in its production. In a number of cities, including Paris, public authorities are actively trying to discourage the use of bottled water, even to the point of experimenting with providing sparkling water through public drinking fountains.²⁹ Consumers can thus have more to spend on other products.

5.2. Affordable economic resources

The next level of affordability is to assess what the implications are in terms of the resources available in the whole economy, usually measured by GDP. This is a constraint, which at the extreme means that programmes of investment whose annual costs exceed 100% of GDP cannot be carried out, whatever the cost-benefit ratios. The real constraints are far below this point, but for poor countries the constraints are worse, because a given investment programme represents a larger share of GDP. So the next step is to calculate what the costs are as a proportion of GDP. It does not matter, for these purposes, whether the necessary investment is financed by consumer spending, government spending or corporate spending (or even aid) – all of this is part of GDP.

This issue is important, because the majority of official and donor publications on water assert or assume that the level of investment – especially in household water and sewerage connections – is unaffordable. The UN's World Water Development Report (WWDR) is typical. It argues that the option of full household connections to sewers and water supply cannot and will not be financed, because the cost of achieving these gains is "above income levels in developing countries" (UN WWDR 2006 p.419).³⁰

The tables below show two recent sets of estimates for the costs of water and sanitation investments. The first was part of an OECD project estimating investment needs in infrastructure sectors, based on collecting a range of country level estimates of actual investments³¹. The second was a PSIRU report on sewerage, examining the costs, benefits and affordability of household connections to sewerage systems.³² The OECD was mainly concerned with the "enormous implications in terms of the ability of service providers for their business models and in raising the necessary finances", while the PSIRU paper was focussed on the macro-economic feasibility of financing household connections over a 10 year programme for all developing countries, based on household connections required, WHO cost estimates, and actual GDP.

Both studies arrived at similar estimates of the proportion of GDP required. They are very close for low income countries, where the OECD range is between 0.71% and 6.30% of GDP, and the PSIRU estimates range from 0.64% to 6.29%. For middle income countries the PSIRU range is lower: 0.11% to 0.89%, compared with the OECD range of 0.54% to 2.60% (Table 8).

The PSIRU estimates provide specific figures at country level, covering the great majority of developing countries. The second table shows the estimated costs for full household connections in countries containing nearly 90% of the population identified by the MDGs, if developed rapidly in a 10-year programme. The costs are less than 1% of GDP per annum for 13 of these countries; and less than 0.5% in 8 of these (Table 9). In only two countries – DR Congo and Ethiopia – do the costs exceed 1.5% of GDP.

Table 8. Required levels of spending on water infrastructure, % of GDP

	OECD range	PSIRU range
Low income countries	0.71% - 6.30%	0.64% - 6.29%
Middle income countries	0.54% - 2.60%	0.11% - 0.89%
High income countries	0.35% - 1.20%	-

Sources: Cashman and Ashley 2008, Hall and Lobina 2008

Table 9. Costs of meeting MDGs in 10 years with household water and sanitation connections

2006 GDP and prices; annual cost = total cost/10, assuming 10 year programme, no borrowing.

L=lower income, ML=lower middle income, MU=upper middle income

	Income group	Annual cost \$m.	Annual cost as %GDP
China	ML	7878	0.30
India	L	5764	0.64
Indonesia	ML	2291	0.73
Brazil	ML	1881	0.21
Nigeria	L	1364	1.48
Philippines	ML	1069	0.89

Pakistan	L	1000	0.82
Bangladesh	L	855	1.22
Iran	ML	790	0.38
Congo DR	L	485	6.29
			as % of global GDP
All developing countries		34900	0.08%

Source: Hall and Lobina 2008

The affordability of this can be assessed using various criteria. Judged in the context of economic growth, it is a relatively small proportion of annual expected growth rates, and so does not even require cutbacks in existing consumer or public spending. As noted above, sub-Saharan African countries are expected to grow at a rate of 4% per annum or more, even after the economic crisis; Latin American countries at a similar rate; and Asian countries at around 7% per annum. China, India and Brazil are already achieving growth rates of nearly 10% in 2010. The cost of completing household connections for water and sewerage in 10 years can thus be met by using less than a quarter of annual growth, in nearly all countries. This still leaves ample room for investment in other infrastructure such as electricity, as well as continued growth of consumer spending.

Judged against the history of national investment in infrastructure in general, it is not an unreasonable level. The average level of public investment in developing countries on all infrastructure has varied between 7% and 10% of Gross National Income (GNI) over the last 35 years, and is generally considered to be too low³³. Spending less than 1% on new investment in water and sanitation is not therefore an excessive burden. There is evidence from national budgets that China and Brazil are already making the necessary levels of investment, and that India is now committed to do so.³⁴ In terms of actual practice, it is clear from the latest JMP report that many countries are in fact already investing the necessary amount to achieve full household connections (see next section). As the review of investment sources makes clear, this investment is being funded from public finance, not private capital.

The requisite levels are thus not only affordable, they are affordable for the great majority of countries *out of national economic resources alone, without need for government borrowing, and even if there were no assistance from donors at all.*

There remains a clear role for aid in those few countries where the costs exceed 1% of GDP per annum. The table shows what would be needed if aid is focussed so that it covers costs in countries where the investment needed exceeds 1% of GDP, then the annual total aid required would be around \$2.2 billion per annum. This is less than half current aid on water and sanitation, and the equivalent of only about \$6.50 per person per annum in high income countries (Table 9).³⁵

Table 10. Level of aid needed to cover countries with annual costs of over 1% of GDP

Country	Annual cost as %GDP	Aid needed to cover spending >1% of GDP (\$m.)
Nigeria	1.48	440
Bangladesh	1.22	156
Congo DR	6.29	408
Sudan	1.18	53
Ethiopia	2.37	177
Other developing countries	>1.0	1002
TOTAL for all developing countries		2236

Source: Hall and Lobina 2008

6. Connections, not improvements

The Millennium Development Goals (MDG) set targets for water and sanitation in terms of ‘improved’ water sources. For the international development agenda, there is thus no commitment to piped household connections. However, it is now clear that developing countries themselves are seeking and achieving household connections. In the last 20 years, two-thirds of the advances in water systems in developing countries consist of household connections, rather than ‘improved sources’. According to the latest JMP report:³⁶

“Between 1990 and 2008, more than 1.2 billion people worldwide gained access to a piped connection on premises. This is more than twice the population that gained access to other improved drinking-water sources.”²

There are clear regional differences. In Eastern Asia (overwhelmingly China), Latin America and North Africa progress was exclusively the result of increases in piped connections on premises. Since 1990, 838 million in these regions gained access to a piped connection, while the number of people with an ‘improved’ source actually declined by 93 million (Chart C).

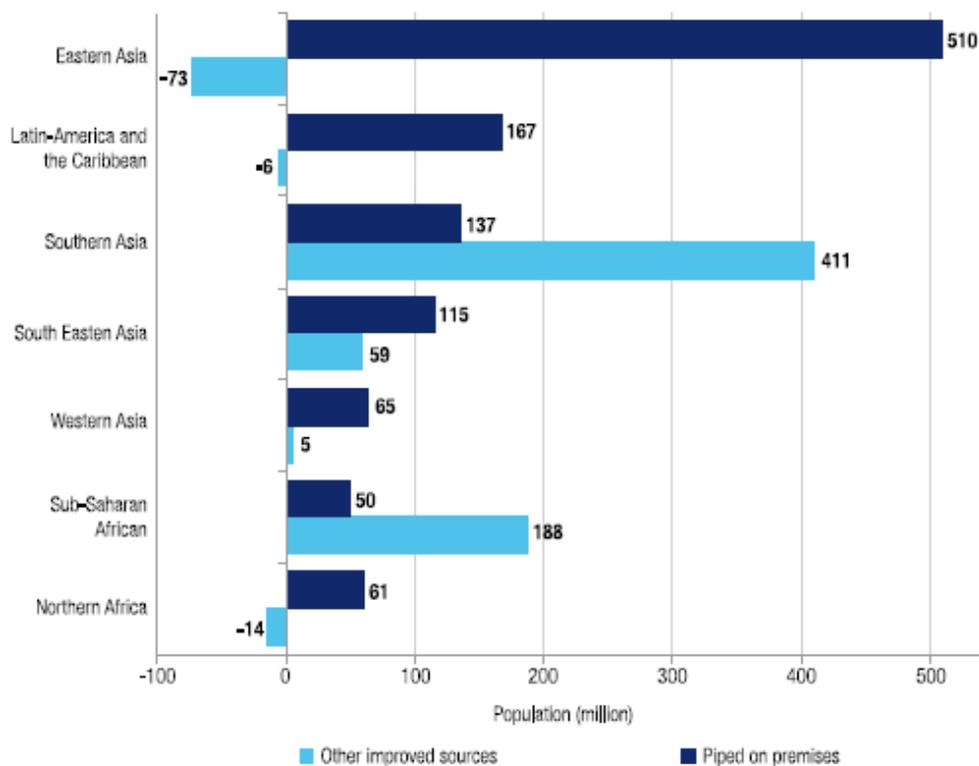
There is also a clear and predictable difference between urban and rural areas. Overall, a remarkable 73% of the urban population of developing countries gets piped water from a household connection, compared with 31% of rural inhabitants. In this too there is a regional disparity: in Sub-Saharan Africa, 35% of urban population have piped water connections, compared with only 5% of the rural population.³⁷

Overall, however, it is clear that countries are preferring to pursue investments in piped household connections rather than simply ‘improved’ connections. Various factors may explain the regional differences, most obviously the lower level of GDP per capita in south Asia and sub-Saharan Africa. This suggests that affordability at the national level is a constraint. It also suggests that the activities of donors and development banks have, at the very least, failed to improve the position of poorer countries in these regions, and that this may be due to the inappropriateness of the financing model they have advocated over the previous 20 years.

The health benefits of household connections has been confirmed by a number of studies, including a study of the installation of household sewerage connections in the city of Salvador, Brazil, which found a 20% fall in child morbidity.³⁸ A review of studies on water, sanitation and child health³⁹ found that the highest health benefits arise from household connections: “Private [i.e. household access to any water technology decreases the relative likelihood of diarrhoea by about 14%, whereas the odds of diarrhoea are reduced by only about 7% if the household uses a public pipe and/or a public well/borehole. The same holds for households that share toilets with several other households: There is no significant impact of access to a public latrine/flush toilet on child diarrhoea, and the effect on child mortality is only 3.3%, whereas private sanitation facilities reduce the odds of diarrhoea by 10% and the likelihood of dying before the age of 5 by 13%.”⁴⁰

Chart C. Population gaining piped household connections or ‘improved’ sources 1990-2008

² It is worth commenting that this result means that about 1800 million people have gained access to some kind of improved water in 18 years since 1990, an annual rate of 100 million per year. This is almost exactly the same as in the international decade of water in the 1980s, generally derided as a failure by the World Bank and others, which provided 1104 million with improved access – a slightly higher annual rate of 110million per year (according to Cashman and Ashley 2008 OECD).



Source: JMP 2010 Progress on Sanitation and Drinking-water: 2010 Update WHO/UNICEF⁴¹

7. Discussion and conclusions

7.1. Divergence from reality

The preceding sections have set out recent evidence on the sources of finance for investment, the implications of the crisis for future finance, the affordability of MDG targets and household connections, and the actual trends in access and household connections. This evidence shows a different picture from that presented by reports from the major international institutions. Investment is taking place – but financed by national public finance, not private investors, nor mainly by aid. The impact of and response to the crisis is likely to reinforce this pattern, with national tax revenues able to grow along with southern economies, while northern aid and corporate investment is threatened. The cost of MDG targets is affordable for the great majority of developing countries, as long as this is done through taxation not user charges. The MDGs are in fact being met, at least in water, and mainly through household connections, not ‘improved’ sources.

This reality contrasts sharply with the view presented by the great majority of official international donor publications. For example, the 2010 OECD paper on ‘innovative financing mechanisms’ asserts that: ‘the water and sanitation sector is seriously under-financed in many countries, leading to the deterioration and potential collapse of the infrastructure’ (OECD 2010c p.3).⁴² But as the latest JMP report makes clear, the MDGs for water will be met, and with a much higher level of household connections than envisaged by the MDGs themselves. The infrastructure, far from collapsing, is being extended faster and on a larger scale than envisaged by international recommendations.

The OECD paper follows this wildly incorrect statement with the advice that ‘in the long-run, structural reforms are needed to improve the sector’s revenue generation potential so as to *fill* the financing gap. In the short to medium term, access to repayable finance (such as loans, bonds and equity) will be critical so as to *bridge* the financing gap... innovation is required so as to increase the attractiveness of the sector to providers of repayable finance, particularly those bringing private sector funds..’ (OECD 2010c p.3) But there is not a great financing gap: infrastructure is being built – by national governments, using public finance. Growth rates mean that adequate economic resources will be available to build more, using public finance, and there is a definable ‘gap’ in the poorest countries which could be filled by aid – but not, certainly, by private capital in search of an attractive return. History confirms that very little investment in

water and sanitation has ever been financed this way. The OECD advice is therefore dangerously misleading.

The OECD paper goes onto admit that ‘public financing has come back to the fore as a significant source of investment’, but even then offers the policy advice that ‘it will be important to evaluate how public financing can be used in an optimal manner so as to leverage repayable finance from the market’ (OECD 2010c p.4).

The calculations set out above on affordability challenge the common donor view that developing countries are economically unable to develop the service themselves without aid and FDI from the north. For example, the World Water Development Report 2006 claimed that “In many nations, at least in the next five to ten years, it will not be possible for the provision deficiencies in most urban areas to be addressed by the conventional model of a (public or private) water utility extending piped water supplies and sewers to individual households.” (UN WWDR 2006 p.419)⁴³ This has turned out to be wrong: the JMP evidence shows not only the scale and pace of new investments, but also that household connections are central. The WWDR also made the Malthusian claim that: “population growth and burgeoning water demand have convinced most policymakers that the cost of water system development will increasingly have to be met by users” (UN WWDR 2006 p.419) (p.), but these policy-makers were wrong: even in Africa, nearly all the investment in the water sector is being financed from taxation, either national or indirectly via aid. Even in Kampala, Uganda, where the water service is run as a commercial venture and is held up as a model, the company relies on government finance from tax revenues for any new investment.⁴⁴

The framework used by donors and international institutions is now sharply different from the reality of water and sanitation services in developing countries. The key features of this divergence are set out diagrammatically in chart D. While the development of water and sanitation services is actually based on public finance, the donor model continues to focus repeatedly on private investment and a role for private finance. The overwhelming majority of operators are public sector, while the donors focus on operating and pricing techniques for private, or commercialised, companies. Household connections to piped water and sewerage are considered too expensive, while developing countries use them as the main way forward. Finally, the donor model sees policy as led by international donors, whilst in practice many national governments are developing their own policies as independent countries – reflecting the reality that they are also providing the great majority of the finance, as well as a more fundamentally democratic approach.

Chart D. Two models: donor/private/improved vs. National/public/household connections

	DONOR MODEL	NATIONAL MODEL
Finance	Private + aid	Public + aid
Operation	Private	Public
Access type	Improved	Household connection
Leading role	Donors, banks	National governments
Location	Rural sources	Urban

7.2. A national framework

This national framework corresponds with a new – or revived – view of the role of the state in development. It is already very clear in Latin American countries, India, China and other Asian countries, where the role of the state in investing in infrastructure is explicitly recognised as a central element in development and economic growth. It is now also being articulated in Africa, by leading politicians and officials, in terms which include an explicit rejection of the role of donors and the role of the market, in favour of a restored strong role for the state.

Two examples of this are worth quoting.

President Museveni of Uganda articulated an emphasis on national decisions, public finance, and relegation of the role of donors, in a speech to the meeting of the Organization of African Unity (OAU) in July 2010:

“Our countries will not have the necessary money without adequate tax collections... One cause of failure to develop infrastructure in Uganda was depending on foreign borrowing or grants. The foreign lending Agencies either do not know or do not care to find out the magnitude of needs Africa has. During the time I have been in Government, I have discovered that depending on external funding for infrastructure development (grants and loans) is very dangerous. The money begged for or borrowed from outside is too little, very unreliable and too slow in coming to be able to help us in dealing with infrastructure.”⁴⁵

Louis Kasekende, Chief Economist of the African Development Bank Group, made a deeper presentation of the issues at a conference in August 2009.⁴⁶

“...the crisis should be grasped as a turning point in the development path of developing countries, particularly here in Africa. In order to overcome the continent’s structural constraints and reduce its external dependence, it is necessary to reconsider the role of the state. The market only works through incremental changes and small steps. However, developing countries need to stimulate investments by socializing risk, in order to achieve long-term structural transformation.....macroeconomic policies across the developing world during the last several decades have been strongly influenced by the recommendations of the international finance institutions and bilateral aid donors who, in turn, were heavily influenced by the neoclassical school..... As argued by several scholars, the reforms based on this approach have largely failed to develop the private sector as the driving force for development. I thus want to table for your consideration the need for a marked change in the approach to macroeconomic policies across the developing world and for one that recognizes that government has a vital role to play in restructuring the economy and in creating the conditions for a ‘take-off’ into sustained growth..... Since economic development is about societal transformation, and not simply a technical economic problem to be left to economists, then governments must also act to ensure that the costs and benefits of adjustment are distributed in an equitable and socially acceptable manner.”⁴⁷

7.3. Policy conclusions

Finally, some policy conclusions may be drawn for both developing countries and donors. Developing countries should continue to plan for development of household water and sewerage connections. The important financial issue is to ensure that sufficient taxes are raised to finance the programme. Attempts to finance it through user charges recovering costs, or attempts to involve the private sector in investment, are likely to be expensive irrelevances that will slow down achievements. Countries such as Indonesia and Philippines need to develop major public infrastructure spending programmes.

Donors should stop encouraging countries to try and finance development of sewerage systems through cost recovery from users, and stop encouraging countries to believe that the private sector will make any significant contribution to investment in sanitation. They should instead help countries to build the taxation capacity needed to finance this investment, and focus aid on the countries in greatest need of assistance, in particular low income African countries, led by Nigeria and the Democratic Republic of Congo.

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9. Annexe: Costs as percentage of GDP: details of OECD and PSIRU estimates

Table I Current levels of required annual expenditure on water infrastructure

<i>Relative income</i>	<i>Percentage of GDP needing to be spent on water and sanitation</i>	<i>Remarks</i>
High	0.35 to 1.20	Based on a lower bound (Italy) and upper bound (France), including figures from Austria, Belgium, Denmark, Finland, Germany, The Netherlands, Portugal, UK and the US
Middle	0.54 to 2.60	Based on a lower bound (Slovakia) and upper bound (Georgia), including figures from Armenia, Azerbaijan, Belarus, Brazil, China, Hungary, Kazakhstan, Poland, Russia, Turkmenistan, and Ukraine
Low	0.71 to 6.30	Based on a lower bound (India), upper bound (Uzbekistan), including Moldova, Kyrgyzstan and Tajikistan

Source: Adrian Cashman, Richard Ashley, (2008) "Costing the long-term demand for water sector infrastructure", Foresight, Vol. 10 Iss: 3, pp.9 – 26 <http://dx.doi.org/10.1108/14636680810883099>

Table 11. Cost of household connections as % of GDP, PSIRU

Country	Income group	% of GDP required for household connections
Afghanistan	L	1.82
Angola	ML	0.66
Argentina	MU	0.2
Bangladesh	L	1.22
Benin	L	1.68
Bolivia	ML	0.9
Brazil	ML	0.21
Burkina Faso	L	1.05
Cambodia	L	0.94
Chad	L	1.36
China	ML	0.3
Congo	L	1.17
Congo DR	L	6.29
Côte d'Ivoire	L	1.1
Cuba	L	
Ecuador	ML	0.27
Egypt	ML	0.33
Ethiopia	L	2.37
Ghana	L	1.91
Guinea	L	1.85
Haiti	L	2.3
India	L	0.64
Indonesia	ML	0.73

Iran	ML	0.38
Kenya	L	0.74
Korea DPR	L	
Korea Rep	H	0.03
Madagascar	L	2.26
Malawi	L	2.73
Malaysia	MU	0.21
Mali	L	1.44
Morocco	ML	0.25
Mozambique	L	2.34
Myanmar	L	
Nepal	L	1.3
Nicaragua	L	0.95
Niger	L	1.39
Nigeria	L	1.48
Pakistan	L	0.82
Paraguay	ML	0.77
Peru	ML	0.19
Philippines	ML	0.89
Rwanda	L	1.7
Senegal	L	1.02
South Africa	MU	0.11
Sri Lanka	ML	0.18
Sudan	L	1.18
Tanzania	L	1.61
Thailand	ML	0.2
Togo	L	2.68
Uganda	L	1
Venezuela	MU	0.19
Viet Nam	L	0.77
Yemen	L	0.91
Zambia	L	0.88

L=lower, MU=upper middle, ML=lower middle

Source: Hall and Lobina 2008 Sewerage Works PSIRU www.psiru.org/reports/2008-03-W-Sewers.doc

10. Notes

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