

Financing water and sanitation: public realities

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Summary

The orthodox model for financing water and sanitation treats the state in developing countries as being unable to finance investment. It promotes instead the primacy of commercial direct financing, with cost recovery from consumers supported by targeted aid. It also emphasises 'improved' connections, rather than household connections. The paper argues that all these positions conflict with empirical evidence.

This does not reflect the historical experience of high income countries. The great majority of investment in water and sanitation services in Europe, North America and Japan, has been carried out by the public sector using public finance raised through taxation. Even in France the extension of the system was carried out by and through municipalities, not through private operators. Central governments have also played a key role in financing investment in water systems, and in managing water resources and floods.

The advantages of public finance are that the state pays lower interest than the private sector, it avoids that poorer 'consumers' cannot afford to pay full costs, and the major benefits of universal water and sanitation connections are public health, not private gains.

The orthodox approach has failed to generate significant amounts of private investment in developing countries. In Africa, the most important source of finance is the public sector in middle income countries, and donor aid in low income countries: the private sector contribution is close to zero. In India, the private sector contribution is also close to zero, with national, state and local governments financing nearly all the investment.

The economic crisis has not affected the prospects for public finance, because of continued economic growth in developing countries, and in increased aid from southern countries. The negative impact on private companies is not significant because of its tiny role.

The costs of providing full water and sewerage household connections are not unaffordable. The benefits in terms of lives saved are very high, and there is a clear positive economic gain even for poorest countries. For the great majority of countries, meeting the Millennium Development Goals (MDGs) by such household connections could be achieved by a 10-year investment programme costing less than 1% of GDP per year, and would deliver significant socio-economic benefits.

Countries are in fact acting in accordance with this reality, and investing close to the amounts necessary for such targets. In the last 20 years, two-thirds of the advances in water systems in developing countries consist of household connections, rather than 'improved sources'. More than 1.2 billion people have received household water connections in that time, the equivalent of the combined populations of all OECD countries - Europe, North America, Japan and Korea together. And overall, the investment by countries has more than achieved the Millennium Development Goals (MDGs) for water.

The framework used by donors and international institutions is now sharply different from the reality of water and sanitation services in developing countries. The two models – the World Bank/donor model, and the national model - have 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.

1. Introduction

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 World Bank/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 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 (Ireland); distributing some part of central tax revenue to support local authority spending on water and other services (Canada); providing cheap loan finance for local authorities to use for capital investment (USA); or collecting part of water charges centrally and redistributing it to authorities which need to invest (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
Private 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 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 1990s, 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 €9 billion 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.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.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 Günther 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...”^{11 12}

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 \$1.23 billion 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 includes an additional figure of \$2.13 billion 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.¹⁴

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

USD \$billions per year

Country category	O&M		Capital expenditure					Total
	Public sector	Public sector	ODA	Non-OECD financiers	Private sector (PPI)	Household self-finance	Total capex	
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 non-fragile	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: Africa’s Infrastructure Table 16.6¹⁵

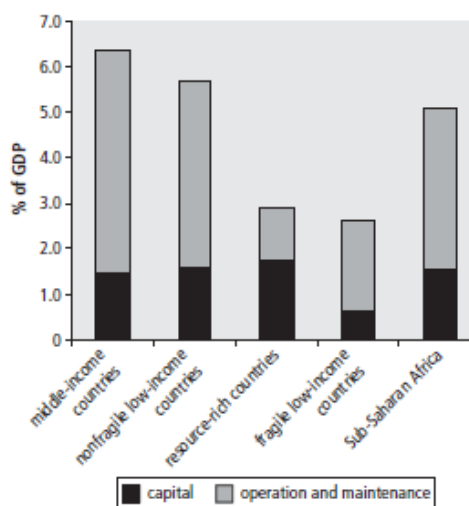
The report also covers other sectors, including energy, transport and communications. Three general findings were that finance is predominantly African, not external; public, not private (except in telecoms); and through central government, not local.

Overall, it noted that in general “spending on infrastructure in Africa is higher than previously thought, amounting to \$45 billion per year”. 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”. Thus external aid and FDI supplement, rather than dominate investment. It also notes that “The public sector remains the dominant source of finance for water, energy, and transport in all but the fragile states”. **The private sector makes no significant contribution to infrastructure investment in Africa except in telecoms.**¹⁶

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 Asia

There is no comparable recent international study on financing of infrastructure in South Asia. Another World Bank study in 2006 estimated that investments in infrastructure in South Asia 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.¹⁷ But data from India shows that this estimate certainly overstates the role of the private sector.

There is a wealth of information on the financing of infrastructure investment in India, in the reports of the Indian Planning Commission. This provides a breakdown by sector – electricity, roads, telecoms etc. – and by the source of financing, under three headings: central government, state government and private sector. The private sector is the greatest source of investment finance in telecoms (82%), and also a large proportion of investment in electricity (44%), but in roads and rail its contribution is very small (16% and 4%

respectively). In water supply and sanitation, there has been investment of over USD \$22 billion in the 5-year period 2007-2012- however, the contribution of the private sector is only 0.4%.

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

Currency converted at R50=\$1

	R crore	US\$ million	% of total investment	% of GDP
Water Supply & Sanitation	111689	22338	100	0.41%
<i>Of which:</i>				
Central government	43235	8647	38.7	
State governments	67971	13594	60.9	
Private sector	484	97	0.4	

Source: Planning Commission of India¹⁸

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: for example, a recent article estimated that globally, local and international private companies were delivering 25% of investment in water and sanitation in developing countries in 2005.¹⁹ But it is consistent with the history of investment in water.

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.²⁰

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”.²¹ 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”.²²

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 2009.²³

African governments are also confidently planning to finance their deficits by borrowing, including issuing bonds. Both Kenya and Tanzania plan to issue €500 million in bonds, 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.²⁴

Public spending as a percentage of GDP has increased across Africa as a whole, and remains above pre-crisis levels. The IMF forecasts GDP growth of 6% in 2012, so the actual volume of public spending will be significantly higher – about 10% higher in 2011 than in 2008, in real terms.²⁵

Table 4. Public spending as % of GDP in sub-Saharan Africa 2006-2012

	2006	2007	2008	2009	2010	2011	2012
Africa	24.8	26.6	27.8	29.8	30.3	29.2	28.4

Source: IMF Regional economic outlook. Sub-Saharan Africa 2011²⁶

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 the austerity policies being adopted. In the water sector, OECD figures show a rise in commitments of ODA for water in 2009, but a sharp drop in 2010, to levels below those of 2008. Given the political pressure for austerity policies, and the fact that developing countries are growing much faster than OECD countries, it is certain that aid from OECD countries will decline as a proportion of GDP of recipient countries.

Table 5. Aid by OECD donor countries - water, 2005-2010 (\$millions)

	2005	2006	2007	2008	2009	2010
ODA commitments	4567.41	3958.85	4412.24	5817.91	6513.57	5249.65

Source : OECD <http://www.oecd.org/dac/stats/idsonline>²⁷

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."²⁸ Thus China's aid to water in Africa is around \$90 million 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.”²⁹

Chart B. Non-OECD aid to Africa, 2006

Country	\$ millions
South Korea	47.8
Turkey	24.9
Arab countries	290.2
China	2300
India	11.3
Brazil	96.1
Total	2770.3

Source: UNCTAD 2010³⁰

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 relative health benefits of household connections has been confirmed by a number of studies. A study of the installation of household sewerage connections in the city of Salvador, Brazil found a 20% fall in child morbidity.³¹ Studies by Günther and Fink found that household water connections reduced episodes of diarrhoea twice as much as a shared pipe, and household toilets by three times as much as shared public facilities. This translates into big differences in mortality rates: household water connections and flush toilets lead to an average mortality reduction of 25 deaths per 1000 live births, whereas ‘improved’ water and sanitation technology (such as public water pumps and ventilated improved pit latrines) only lowers child mortality by 8 deaths per 1000. The effect of household connections is also longer lasting, because the technology is more durable. This impact of full household connections would by itself achieve 41% of the improvement in child mortality needed to meet the MDG for child mortality rates.³²

Purely in economic terms, these benefits are larger than the costs of the investments. Günther and Fink calculate each year of life saved by water and sewerage connections costs less than the economic output per person per year for the great majority of developing countries (as measured by GDP per capita). They also found that full household connections are more cost-effective than just ‘improved’ sanitation because of the long-lasting nature of the infrastructure and its effects.³³ 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”.³⁴

Table 7. Cost per life-years saved as % of GDP per capita, selected African countries
(full household connections water and sewerage.)

Country	Cost per life year saved as % of GDP per capita		
Benin	0.722	Mali	0.528
Burkina Faso	0.380	Mozambique	0.359
Cameroon	0.273	Namibia	0.310
Chad	0.205	Niger	0.675
Congo, Rep.	0.299	Nigeria	0.228
Gabon	0.150	Senegal	0.283
Ghana	0.843	Swaziland	0.116
Guinea	0.205	Tanzania	1.125
Kenya	0.605	Uganda	0.753
Lesotho	0.644	Zambia	0.283
Liberia	2.898	Zimbabwe	0.855
Madagascar	2.164	Average	0.655
Malawi	0.827		

Source: Günther and Fink 2011, Table 10³⁵

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 on global water economics by McKinsey 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”.³⁶

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”.³⁷ 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.³⁸ 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).³⁹

The tables below shows 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 investments.⁴⁰ The second was a PSIRU report on sewerage, examining the costs, benefits and affordability of household connections to sewerage systems.⁴¹ 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, it is not an unreasonable level. The average level of public investment in developing countries as a whole 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 low. Spending less than 1% on new investment in water and sanitation is not therefore an excessive burden.⁴²

For India, the data from the Indian Planning Commission shows that over the period 2007-2012, actual investment in water and sanitation infrastructure has averaged 0.41% of GDP. Investment in all infrastructure in India has averaged 7.5% of GDP during that period, with the public sector financing nearly two-thirds of that, nearly 5% of GDP.⁴³ There is evidence from national budgets that China and Brazil are already making the necessary levels of investment.⁴⁴ 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).⁴⁵

Table 10. Level of aid needed for household water and sewerage connections 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 developing countries, to be achieved by 2015. Remarkably, the MDG for drinking water has already been achieved, 5 years ahead of target. By 2010, only 11% of the world's population were using 'unimproved' water sources, compared with the MDG target of less than 12%.

Although the MDGs were expressed only in terms of 'improved' sources, it is also clear that developing countries themselves are mainly seeking and achieving household connections. In the last 20 years, two-thirds of the advances in water systems in developing countries consisted of new household connections, rather than 'improved sources'. Between 1990 and 2010, a period of 20 years, more than 1.26 billion people worldwide gained access to a piped connection on the premises, equivalent to the combined populations of all OECD countries, including all of Europe, North America, Japan and Korea. This is an astonishing achievement in such a short period. Developing countries have also provided 'improved' sanitation for an extra 1.6 billion people, covering 56% of the population in all. This falls short of the MDG target of 75%, and there is no data on household sewerage connections as opposed to 'improved'.⁴⁶ *

Table 11. Household piped water connections and MDGs: developing regions

year	Population with household piped connection		Population with 'improved' water source		Population with 'improved' sanitation	
	%	Millions	%	Millions	%	Millions
1990	32	1,324	70	2,896	36	1,489
2010	46	2,589	86	4,840	56	3,152
Change (nos)		1,265		1,944		1,662
Change %		96		67		112

Source: JMP Progress on Drinking Water and Sanitation: 2012 Update⁴⁷

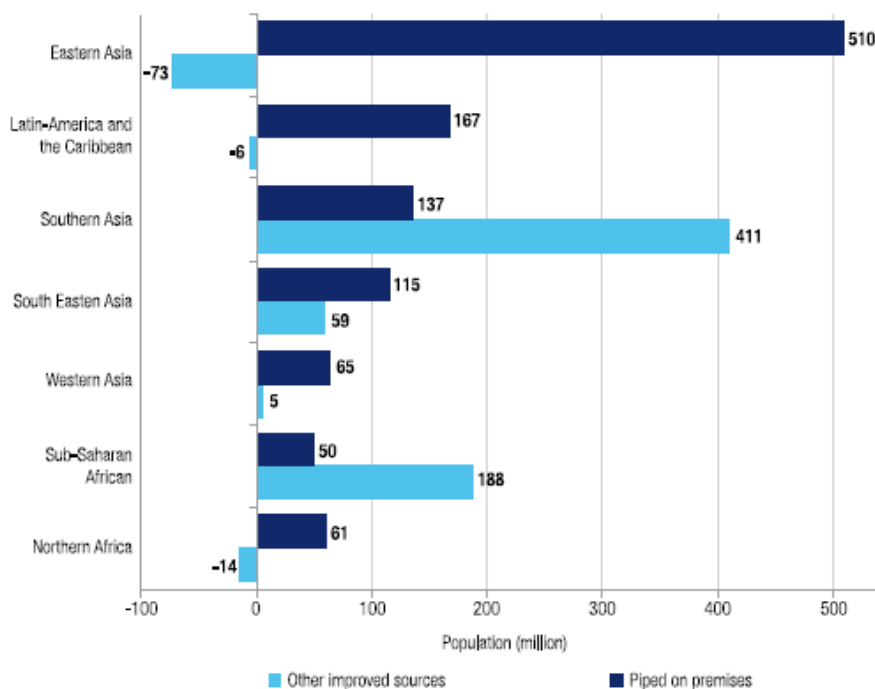
There are regional differences. In Eastern Asia (overwhelmingly China), Latin America, West Asia and North Africa progress was exclusively the result of increases in piped water connections on premises, while the number of people with an 'improved' source actually declined by 93 million (Chart D). In these regions, the percentage of the entire population with piped household water connections is already close to the level of 92% in high income countries. The corresponding connection rate is 70% in China and 83-86% in Latin America, West Asia and North Africa. The level of piped household water connections in Latin America, at 86%, is virtually identical to that of Canada, at 87%: Brazil (92%), and Chile (93%) are doing better than Canada.

There is also a predictable difference between urban and rural areas. Overall, 73% of the urban population of developing countries now gets piped water from a household connection, compared with 24% of rural inhabitants. In this too there is a regional disparity: in Sub-Saharan Africa, 34% of urban population have piped connections, compared with only 5% of the rural population.⁴⁸

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.

* This result means that people have gained access to some kind of improved water source at an annual rate of nearly 100 million per year. This compares with the slightly higher annual rate of 110 million per year in the international decade of water in the 1980s, which involved only the public sector and governments, and was generally derided as a failure by the World Bank and others (according to Cashman and Ashley 2008 OECD).

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



Source: JMP 2010 Progress on Sanitation and Drinking-water: 2010 Update WHO/UNICEF⁴⁹

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'.⁵⁰ 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.'⁵¹ 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 on to 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’.⁵²

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.”⁵³ 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”,⁵⁴ 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.⁵⁵

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 World Bank/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 World Bank/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

	WORLD BANK/DONOR MODEL	NATIONAL MODEL
Finance	Private + aid	Public + aid
Operation	Private	Public
Access type	Improved	Household connection
Leading role	Donors, banks, companies	National governments
Location focus	Rural	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.”⁵⁶

Louis Kasekende, Chief Economist of the African Development Bank Group, made a deeper presentation of the issues at a conference in August 2009.⁵⁷

“...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.”⁵⁸

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 to 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 African countries, led by the Democratic Republic of Congo.

8. Bibliography

- Barraqué, Bernard (2007) 'Small Communes, Centralisation, and Delegation to Private Companies: The French Experience', *Journal of Comparative Social Welfare*, 23:2, 121 – 130 http://pdfserve.informaworld.com/297693_751311873_781353829.pdf
- Briceño-Garmendia C., Antonio Estache, Nemat Shafik. Infrastructure Services in Developing Countries: Access, Quality, Costs and Policy Reform. INFVP World Bank Policy Research Working Paper 3468, December 2004
- Chatterton I. and Olga Susana Puerto 2006 'Estimation of infrastructure investment needs in the South Asia region [http://www1.fidic.org/resources/representation/statistics/invest-needs-asia-Inf Investment Needs IC version4.pdf](http://www1.fidic.org/resources/representation/statistics/invest-needs-asia-Inf_Investment_Needs_IC_version4.pdf)
- Clarke Annez P. Urban Infrastructure Finance From Private Operators: What Have We Learned From Recent Experience? World Bank Policy Research Working Paper 4045, November 2006 <http://go.worldbank.org/N7HA8M3E20>
- Costain C. 2010 The Economics of Sanitation Initiative (ESI) India Impact Study Summary of Findings
- Foss-Mollan K. 2001 Hard Water: Politics and Water Supply in Milwaukee, 1870-1995. Purdue University Press 2001
- Gassner K., Alexander Popov, and Nataliya Pushak. 2009. Does private sector participation improve performance in electricity and water distribution? PPIAF Trends and policy options; no. 6. p.49 http://www.ppiaf.org/documents/trends_and_policy/PSP_water_electricity.pdf
- Grey D. and C. W. Sadoff 2007 Sink or Swim? Water security for growth and development/ *Water Policy* 9 (2007) 545–571 <http://doi:10.2166/wp.2007.021>
- Günther I. and Fink G. 2011 Water and Sanitation to Reduce Child Mortality The Impact and Cost of Water and Sanitation Infrastructure World Bank Policy Research Working Paper 5618 http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2011/03/30/000158349_20110330154747/Rendered/PDF/WPS5618.pdf
- Günter I and Fink G. 2010 Water, Sanitation and Children's Health: Evidence from 172 DHS Surveys WPS5275 Policy Research Working Paper 5275 http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2010/04/19/000158349_20100419124219/Rendered/INDEX/WPS5275.txt
- Hall D. and Emanuele Lobina 2008 Water in Europe PSIRU www.psiru.org/reports/2008-01-W-EU.doc
- Hall D. and Lobina E. 2006 Pipe Dreams PSIRU <http://www.psiru.org/reports/2006-03-W-investment.pdf>
- Hall D. and Lobina E. 2008 Sewerage Works <http://www.psiru.org/reports/2008-03-W-sewers.pdf>
- Hall D. et al. 2005 Public Resistance to privatisation in Water and Electricity Development in Practice, Volume 15, Numbers 3 & 4, June 2005 <http://www.psiru.org/reports/2005-06-W-E-resist.pdf>
- IMF 2008 World Economic Outlook Update 06 November 2008 <http://www.imf.org/external/pubs/ft/weo/2008/update/03/index.htm>
- IMF 2010a Sub-Saharan Africa Back to High Growth. IMF Regional Economic Outlook April 2010 <http://www.imf.org/external/pubs/ft/reo/2010/AFR/eng/sreo0410ch2.pdf>
- IMF 2010b World Economic Outlook: Rebalancing growth <http://www.imf.org/external/pubs/ft/weo/2010/01/index.htm>
- IMF WEO 2010: Rebalancing growth <http://www.imf.org/external/pubs/ft/weo/2010/01/index.htm>
- Jimenez A. and Perez-Foguet A. 2009 International Investments in the Water Sector *International Journal of Water Resources Development* Vol. 25, Iss. 1, 2009 <http://www.tandfonline.com/doi/abs/10.1080/07900620802573759>
- JMP 2010 Progress on Sanitation and Drinking-water: 2010 Update WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation <http://www.wssinfo.org/>)
- Marin P. 2009 Public-Private Partnerships For Urban Water Utilities: A Review Of Experiences In Developing Countries. World Bank/PPIAF http://siteresources.worldbank.org/EXTWAT/Resources/4602122-1213366294492/5106220-1234469721549/3.5_Water_PPP2.pdf
- Massarutto, A., V. Paccagnan, and E. Linares (2008), Private management and public finance in the Italian water industry: A marriage of convenience?, *Water Resour. Res.*, 44, W12425, doi:10.1029/2007WR006443. <http://www.agu.org/journals/ABS/2008/2007WR006443.shtml>

McKinsey & Co., 2009 Charting Our Water Future - Economic frameworks to inform decision-making. P.98
http://www.mckinsey.com/App_Media/Reports/Water/Charting_Our_Water_Future_Full_Report_001.pdf

Melosi, M.V. 2000 The Sanitary City. Urban Infrastructure in America from the Colonial Times to the Present. The John Hopkins University Press.

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

OECD 2010b DAC statistics <http://www.oecd.org/dac/stats/data>

OECD 2010c Innovative Financing Mechanisms for the Water Sector http://www.oecd-ilibrary.org/environment/innovative-financing-mechanisms-for-the-water-sector_9789264083660-en

Petri S. Juuti & Tapio S. Katko (eds), Water, Time and European Cities: History matters for the Futures 2005.
<http://www.watertime.net/Docs/WP3/WTEC.pdf>

Pezon, Christelle. 2009 [Decentralization and Delegation of Water and Sanitation Services in France](#), In Water and sanitation services: public policy and management edited by José Esteban Castro, Léo Heller Earthscan

Pharasi S. and C.A. Kennedy (2002) Reflections On The Financial History Of Toronto's Urban Water Infrastructure Department of Civil Engineering, University of Toronto, Ontario, Canada Congrès annuel de la Société canadienne de génie civil Annual Conference of the Canadian Society for Civil Engineering Montréal, Québec, Canada 5-8 juin 2002 / June 5-8, 2002
<http://pedago.cegepoutaouais.qc.ca/media/0260309/0378334/SCGC-BON/Documents/GE062-PHARASI-Kennedy.pdf>

Regional Team Leader Water and Sanitation Program-South Asia (WSP-SA) September 2010

UN WWDR 2006. Water – a shared responsibility. The UN World Water Development Report 2. p.419. 2006
<http://www.unesco.org/water/wwap/wwdr2/index.shtml>

UNCTAD 2008 World Investment Report http://www.unctad.org/en/docs/wir2008_en.pdf

UNCTAD 2010 South-South Cooperation: Africa and the New Forms of Development Partnership' UNCTAD Economic Development in Africa Report 2010 p. 72 <http://www.unctad.org/Templates/WebFlyer.asp?intItemID=5491&lang=1>

UNCTAD 2010 South-South Cooperation: Africa and the New Forms of Development Partnership' UNCTAD Economic Development in Africa Report 2010 <http://www.unctad.org/Templates/WebFlyer.asp?intItemID=5491&lang=1>

World Bank 2010 Global Economic Prospects 2010 p.5-6 <http://siteresources.worldbank.org/INTGEP2010/Resources/FullReport-GEPSummer2010.pdf>

World Bank/AFD 2010 Africa's Infrastructure 2010
http://www.infrastructureafrica.org/aicd/system/files/AIATT_Consolidated_smaller.pdf A range of material based on this is at <http://go.worldbank.org/NGTDDHDB0>

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

Table 12. Cost of water and sanitation investment as % of GDP, OECD

Table 1 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 13. Cost of household connections as % of GDP, PSIRU

Country	Income group	% of GDP required for household connections	
Afghanistan	L	1.82	2.73
Angola	ML	0.66	0.21
Argentina	MU	0.2	1.44
Bangladesh	L	1.22	0.25
Benin	L	1.68	2.34
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

- ¹ Petri S. Juuti & Tapio S. Katko (eds), Water, Time and European Cities: History matters for the Futures 2005. <http://www.watertime.net/Docs/WP3/WTEC.pdf> ; Barraqué, Bernard (2007) 'Small Communes, Centralisation, and Delegation to Private Companies: The French Experience', *Journal of Comparative Social Welfare*, 23:2, 121 – 130 http://pdfserve.informaworld.com/297693_751311873_781353829.pdf
- ² Kate Foss-Mollan. *Hard Water: Politics and Water Supply in Milwaukee, 1870-1995*. Purdue University Press 2001; Melosi, M.V. 2000. *The Sanitary City, Urban Infrastructure in America from the Colonial Times to the Present*. The John Hopkins University Press
- ³ Pezon, Christelle. 2009 [Decentralization and Delegation of Water and Sanitation Services in France](#) In *Water and sanitation services: public policy and management* edited by José Esteban Castro, Léo Heller Earthscan 2009
- ⁴ David Hall and Emanuele Lobina 2008 *Water in Europe* PSIRU www.psiru.org/reports/2008-01-W-EU.doc
- ⁵ D. Grey and C. W. Sadoff 2007 Sink or Swim? Water security for growth and development/ *Water Policy* 9 (2007) 545–571 <http://doi:10.2166/wp.2007.021>
- ⁶ S. Pharasi and C.A. Kennedy (2002) Reflections On The Financial History Of Toronto's Urban Water Infrastructure Department of Civil Engineering, University of Toronto, Ontario, Canada Congrès annuel de la Société canadienne de génie civil Annual Conference of the Canadian Society for Civil Engineering Montréal, Québec, Canada 5-8 juin 2002 / June 5-8, 2002 <http://pedago.cegepoutaouais.qc.ca/media/0358894/wps/en/contenu/doc/confgen/pdf/GE062-PHARASI-Kennedy.pdf>
- ⁷ The Development of Water Supply and Sewage Infrastructure in Ontario, 1880-1990s: Legal and Institutional Aspects of Public Health and Environmental History A Background Paper for the Walkerton Inquiry February 2001 <http://tspacetest.library.utoronto.ca:8080/bitstream/1778/4019/1/10294043.pdf>
- ⁸ S. Pharasi and C.A. Kennedy (2002) Reflections On The Financial History Of Toronto's Urban Water Infrastructure Department of Civil Engineering, University of Toronto, Ontario, Canada Congrès annuel de la Société canadienne de génie civil Annual Conference of the Canadian Society for Civil Engineering Montréal, Québec, Canada 5-8 juin 2002 / June 5-8, 2002 <http://pedago.cegepoutaouais.qc.ca/media/0358894/wps/en/contenu/doc/confgen/pdf/GE062-PHARASI-Kennedy.pdf>
- ⁹ Massarutto, A., V. Paccagnan, and E. Linares (2008), Private management and public finance in the Italian water industry: A marriage of convenience?, *Water Resour. Res.*, 44, W12425, doi:10.1029/2007WR006443. <http://www.agu.org/journals/ABS/2008/2007WR006443.shtml>
- ¹⁰ There is a large literature on this subject, covering other infrastructure sectors as well as water.
- ¹¹ Patricia Clarke Annez. *Urban Infrastructure Finance From Private Operators: What Have We Learned From Recent Experience?* World Bank Policy Research Working Paper 4045, November 2006 <http://go.worldbank.org/N7HA8M3E20>
- ¹² Philippe Marin 2009 *Public-Private Partnerships For Urban Water Utilities: A Review Of Experiences In Developing Countries*. World Bank/PPIAF http://siteresources.worldbank.org/EXTWAT/Resources/4602122-1213366294492/5106220-1234469721549/3.5_Water_PPP2.pdf ; Hall D. et al. 2005 *Public Resistance to privatisation in Water and Electricity Development in Practice*, Volume 15, Numbers 3 & 4, June 2005 <http://www.psiru.org/reports/2005-06-W-E-resist.pdf> ; Katharina Gassner, Alexander Popov, and Nataliya Pushak. 2009 .Does private sector participation improve performance in electricity and water distribution? PPIAF Trends and policy options ; no. 6. p.49 http://www.ppiaf.org/documents/trends_and_policy/PSP_water_electricity.pdf ; Hall and Lobina 2006 *Pipe Dream* PSIRU : <http://www.psiru.org/reports/2006-03-W-investment.pdf> ; Hall and Lobina 2008 *Sewerage Works*: <http://www.psiru.org/reports/2008-03-W-sewers.pdf>).
- ¹³ Africa's Infrastructure http://www.infrastructureafrica.org/aicd/system/files/AIATT_Consolidated_smaller.pdf . A range of material based on this is at <http://go.worldbank.org/NGTDDHDDBO>
- ¹⁴ 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
- ¹⁵ World Bank/AFD 2010 Africa's Infrastructure Table 16.6 http://www.infrastructureafrica.org/aicd/system/files/AIATT_Consolidated_smaller.pdf
- ¹⁶ World Bank/AFD 2010 Africa's Infrastructure p.8 http://www.infrastructureafrica.org/aicd/system/files/AIATT_Consolidated_smaller.pdf
- ¹⁷ Isabel Chatterton and Olga Susana Puerto 2006 'Estimation of infrastructure investment needs in the south asia region' http://www1.fidic.org/resources/representation/statistics/invest-needs-asia-Inf_Investment_Needs_IC_version4.pdf
- ¹⁸ http://planningcommission.nic.in/aboutus/committee/strgrp11/str11_hud1.pdf, p. 55-56
- ¹⁹ Jimenez A. and Perez-Foguet A. 2009 *International Investments in the Water Sector* *International Journal of Water Resources Development* Vol. 25, Iss. 1, 2009 <http://www.tandfonline.com/doi/abs/10.1080/07900620802573759>
- ²⁰ *Infrastructure Services in Developing Countries: Access, Quality, Costs and Policy Reform*. Cecilia Briceño-Garmendia, Antonio Estache, Nemat Shafik INFVP World Bank Policy Research Working Paper 3468, December 2004
- ²¹ IMF WEO 2010: Rebalancing growth <http://www.imf.org/external/pubs/ft/weo/2010/01/index.htm>

- ²² Global Economic Prospects 2010 p.5-6 <http://siteresources.worldbank.org/INTGEP2010/Resources/FullReport-GEPSummer2010.pdf>
- ²³ Sub-Saharan Africa Back to High Growth. IMF Regional Economic Outlook April 2010 <http://www.imf.org/external/pubs/ft/reo/2010/AFR/eng/sreo0410ch2.pdf>
- ²⁴ IMF estimates of spreads and interest rates for SSA countries May 2010 <http://www.imf.org/external/pubs/ft/wp/2010/wp10140.pdf>
- ²⁵ IMF Regional economic outlook, Sub-Saharan Africa 2011 <http://www.imf.org/external/pubs/ft/reo/2011/afr/eng/sreo0411.pdf>
- ²⁶ IMF Regional economic outlook, Sub-Saharan Africa 2011 <http://www.imf.org/external/pubs/ft/reo/2011/afr/eng/sreo0411.pdf>
- ²⁷ Query generated at <http://stats.oecd.org/qwids/#?x=1&y=6&f=3:40,4:1,5:4,2:1,7:1&q=3:51,40+4:1+5:4+2:1+7:1+1:2+6:2005,2006,2007,2008,2009,2010>
- ²⁸ Lum *et al.* (2009) quoted in 'South-South Cooperation: Africa and the New Forms of Development Partnership' UNCTAD Economic Development in Africa Report 2010 <http://www.unctad.org/Templates/WebFlyer.asp?intItemID=5491&lang=1>
- ²⁹ South-South Cooperation: Africa and the New Forms of Development Partnership' UNCTAD Economic Development in Africa Report 2010 p. 72 <http://www.unctad.org/Templates/WebFlyer.asp?intItemID=5491&lang=1>
- ³⁰ South-South Cooperation: Africa and the New Forms of Development Partnership' UNCTAD Economic Development in Africa Report 2010 Table 6 <http://www.unctad.org/Templates/WebFlyer.asp?intItemID=5491&lang=1>
- ³¹ For this and other references see Hall and Lobina 2008, p.11
- ³² Isabel Günther and Günther Fink 2010 Water, Sanitation and Children's Health Evidence from 172 DHS Surveys, World Bank Policy Research Working Paper 5275 ; Günther I. and Fink G. 2011 Water and Sanitation to Reduce Child Mortality The Impact and Cost of Water and Sanitation Infrastructure World Bank Policy Research Working Paper 5618 http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2011/03/30/000158349_20110330154747/Rendered/PDF/WPS5618.pdf
- ³³ Günther I. and Fink G. 2011 Water and Sanitation to Reduce Child Mortality The Impact and Cost of Water and Sanitation Infrastructure World Bank Policy Research Working Paper 5618 http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2011/03/30/000158349_20110330154747/Rendered/PDF/WPS5618.pdf
- ³⁴ The Economics of Sanitation Initiative (ESI) India Impact Study Summary of Findings Christopher Juan Costain Regional Team Leader Water and Sanitation Program-South Asia (WSP-SA) September 2010
- ³⁵ Günther I. and Fink G. 2011 Water and Sanitation to Reduce Child Mortality The Impact and Cost of Water and Sanitation Infrastructure World Bank Policy Research Working Paper 5618 http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2011/03/30/000158349_20110330154747/Rendered/PDF/WPS5618.pdf
- ³⁶ McKinsey & Co., 2009 Charting Our Water Future - Economic frameworks to inform decision-making. p.98 http://www.mckinsey.com/App_Media/Reports/Water/Charting_Our_Water_Future_Full_Report_001.pdf
- ³⁷ ASA Adjudication on Coca-Cola Great Britain 8 October 2008 http://www.asa.org.uk/Complaints-and-ASA-action/Adjudications/2008/10/Coca_Cola-Great-Britain/TF_ADJ_45117.aspx
- ³⁸ The Guardian, 21 September 2010 Eau la la! Parisians get free fizzy water from a park fountain <http://www.guardian.co.uk/world/2010/sep/21/paris-park-fizzy-water-tap>
- ³⁹ WWDR 2006, Water – a shared responsibility. The UN World Water Development Report 2. p.419. 2006 <http://www.unesco.org/water/wwap/wwdr2/index.shtml>
- ⁴⁰ Cashman and 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>. These were then used as the basis for 30 year forecasts, using various assumptions about growth.
- ⁴¹ Hall and Lobina 2008 Sewerage Works PSIRU www.psiru.org/reports/2008-03-W-sewers.doc
- ⁴² Rathin Roy, Antoine Heuty, Emmanuel Letouzé, Fiscal Space for Public Investment: - Towards A Human Development Approach. UNDP, September 2006.
- ⁴³ Indian Planning Commission 2011 Investment in Infrastructure during the Eleventh Five Year Plan pp6-7 <http://infrastructure.gov.in/pdf/inv-infra.pdf>
- ⁴⁴ Hall and Lobina 2008 Sewerage Works PSIRU www.psiru.org/reports/2008-03-W-sewers.doc
- ⁴⁵ Hall and Lobina 2008 Sewerage Works PSIRU www.psiru.org/reports/2008-03-W-sewers.doc
- ⁴⁶ JMP Progress on Drinking Water and Sanitation: 2012 Update http://www.wssinfo.org/fileadmin/user_upload/resources/JMP-report-2012-en.pdf
- ⁴⁷ JMP Progress on Drinking Water and Sanitation: 2012 Update http://www.wssinfo.org/fileadmin/user_upload/resources/JMP-report-2012-en.pdf
- ⁴⁸ JMP 2010 Progress on Sanitation and Drinking-water: 2010 Update WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation <http://www.wssinfo.org/>; and JMP Progress on Drinking Water and Sanitation: 2012 Update http://www.wssinfo.org/fileadmin/user_upload/resources/JMP-report-2012-en.pdf
- ⁴⁹ JMP 2010 Progress on Sanitation and Drinking-water: 2010 Update WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation <http://www.wssinfo.org/>
- ⁵⁰ Innovative Financing Mechanisms for the Water Sector - OEC D 2010 - <http://www.oecd.org:80/water>
- ⁵¹ Innovative Financing Mechanisms for the Water Sector - OEC D 2010 - <http://www.oecd.org:80/water>
- ⁵² Innovative Financing Mechanisms for the Water Sector - OEC D 2010 - <http://www.oecd.org:80/water>
- ⁵³ WWDR 2006. Water – a shared responsibility. The UN World Water Development Report 2. p.419. 2006 <http://www.unesco.org/water/wwap/wwdr2/index.shtml>
- ⁵⁴ WWDR 2006. Water – a shared responsibility. The UN World Water Development Report 2. p.419. 2006 <http://www.unesco.org/water/wwap/wwdr2/index.shtml>
- ⁵⁵ William Murhaiwe, CEO of NWSC Uganda, speaking at the World Water Forum Istanbul, March 2009

⁵⁶ Speech By H.E. Yoweri Kaguta Museveni President of the Republic of Uganda At the Opening of The African Union Summit Theme: Maternal, Infant and Child Health and Development in Africa 25th July 2010 Commonwealth Resort, Munyonyo, Kampala <http://www.mediacentre.go.ug/details.php?catId=6&item=946>

⁵⁷ Extracts from “Public Policy and Economic Development in Africa” Speech by Mr Louis Kasekende, Chief Economist, African Development Bank Group, 65th Congress of the International Institute of Public Finance August 13, 2009, Cape Town, South Africa www.iipf.org/speeches/Kasekende_2009.pdf

⁵⁸ Extracts from “Public Policy and Economic Development in Africa” Speech by Mr Louis Kasekende, Chief Economist, African Development Bank Group, 65th Congress of the International Institute of Public Finance August 13, 2009, Cape Town, South Africa www.iipf.org/speeches/Kasekende_2009.pdf