Achieving the SDGs: public good with private money?

The contribution of economics to water and sanitation problems

Meine Pieter van Dijk
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Valedictory speech on World Water Day 2014 at UNESCO-IHE Institute for Water Education in Delft, a day to focus attention on the importance of freshwater and advocating for the sustainable management of freshwater resources.

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Abstract in Dutch

De SDGs dienen om armoede en gerelateerde verschijnselen in de wereld op duurzame wijze te bestrijden. Ze zijn belangrijk en kunnen als een internationaal 'public good' worden gezien. Dat betekent dat iedereen er aan bijdragen moet dat ze gerealiseerd worden en ze behoeven in het bijzonder financiering. De economische wetenschap kan helpen te bepalen om hoeveel geld het gaat en onder welke voorwaarde particuliere investeringen beschikbaar zouden komen voor dat doel. Daartoe moet de rol van de economie in de water sector heroverwogen worden en economie weer een ethische discipline worden, met expliciete normen over productie en consumptie en de inzet van arbeid, hier en in de derde wereld. Economie wordt in de afscheidsrede gezien als een gereedschapskist die een sleutel kan leveren voor ieder in de water sector geïdentificeerd probleem. Het betoog omvat zeven verhalen:

Diving into the MDGs, first studying drinking water, then toilets. Het verhaal is hoe de MDGs leidde tot onderzoek naar de economie van particuliere drinkwater voorzieningen en zelf gebouwde of gedeelde toiletten. Die toiletten zijn volgens mij geen publieke goederen, maar de mensen die deze initiatieven nemen en de kleine bedrijven die hun daarbij helpen verdienen wel steun omdat er wel de bestrijding van armoede mee wordt gerealiseerd en armoede is een ‘global public good’.

Als institutioneel econoom werkzaam in de water sector ben ik op zich voor de werking van markten, maar vind dat die gecorrigeerd moeten worden door instituties te creëren die zorgen voor een eerlijker verdeling en die de normen van de maatschappij reflecteren. Gebruik makend van freakonomics worden enkele specifieke vraagstukken in de water sector in een ander licht geplaatst.

Het eerste voorbeeld betreft hoe de rol van de particuliere sector op water gebied te beoordelen. Vervolgens is mijn verhaal dat de particuliere sector breder opgevat moet worden inclusief de initiatieven van huishoudens en kleine bedrijven om drinkwater en sanitaire voorzieningen te verbeteren door daar financieel aan bij te dragen of het te organiseren. Dan kunnen op grond van onderzoek de voorwaarden voor succesvolle interventies van de particuliere sector in water gerelateerde activiteiten worden geformuleerd. Ten slotte wordt dit kader los gelaten op plannen om Jakarta via een dijk in zee te beschermen voor overstroming. Volgens de Indonesische overheid moet dit geheel door de particuliere sector gefinancierd worden. Is dat gezien de geformuleerde voorwaarden reëel?

De particuliere sector bevat ook niet-gouvernementele organisaties, maar belangrijker de vele kleine bedrijven in ontwikkelingslanden en de initiatieven van de mensen zelf om hun drinkwater en sanitatie situatie te verbeteren. Dat soort activiteiten kan ook gefaciliteerd worden in een pro-poor Millennium Development Goals (MDG), of Sustainable Development Goals (SDG) drinkwater en sanitatie beleid.
Achieving the SDGs: public good with private money?
1

Introduction

1.1 12 or even 18 years IHE

I have been working at UNESCO-IHE since 1996, originally as a guest lecturer and a reader of MSc theses. My formal employment as a full professor started September 2002, but informally I had been engaged in the water services management specialization already in the spring of 2002 and in May of that year I visited the World Bank Water week with Maarten Blokland and Klaas Schwartz my closest colleagues in these 12 years. The topic we were prepared for was privatisation in the water sector, but in fact the World Bank director concerned announced that the high time of privatisation in the sense of divestiture (selling the shares of the water companies) was over and that the emphasis was now on private sector involvement (PSI) to increase the efficiency of public utilities. That topic has largely dominated my work here and I like to look back and deal with three issues in particular:

1. Can the private sector in general and private finance in particular help to develop the water and sanitation sector?1
2. To what extent has and will the private sector play a role in achieving the Millennium Development Goals (MDGs) and eventually the Sustainable Development Goals (SDGs)?2
3. Under which conditions can private sector involvement in the water sector be successful in achieving the SDGs?

In this valedictory speech ‘Achieving the SDGs’, the follow-up of the MDGs are at the centre and not the changing boundary conditions of UNESCO-IHE, summarized in a recent mail by the deputy rector as challenging because global changes bring water even higher to the political agenda, and the impact of water research in the developing world is more important than ever.

Furthermore he notes that the post-2015 development agenda is being shaped by the UN (the SDGs), while there is an acceleration of knowledge generation and sharing, e.g. publications, Open Access (OA) publishing, the role of knowledge networks, etc. This is the context in which we work now, but when I started at UNESCO-IHE the MDGs played a similar role as I experienced during the World Water Week in Kyoto in 2003. We were expected to give a contribution to the achievement of these MDGs through our research and teaching and discovered that many governments and donor organizations took them as political commitments, which should be taken seriously. The question asked to me for
this valedictory speech was: can we finance this new public good (the SDGs) with private money?’ The definitions of MDGs and SDGs are given in box 1.

Poor people build pit latrines, use a collective facility or ‘go into the bush’. Jogging through Accra I started making pictures of these solutions and later in Arusha and Kampala we organized slum toilet tours, surprised by the variety of buildings or shacks and of their different governance structures. I got interested in the economics of sanitation: what does it cost to build, to maintain, to operate a toilet? Is there a cost recovery system in place and does it function? In 2008 I published a paper on the role of small scale independent providers in water and sanitation in a special issue of the International journal of water (IJW) on the role of the private sector arguing that the role of small scale entrepreneurs is even more important in sanitation than in drinking water (Van Dijk, 2008). Small enterprises build, maintain and empty pit latrines and this informal private sector is quite labour intensive and financially sustainable. Of course this is another private sector than the sector of the large scale national and international water companies such as Suez or Thames water. This new interest married well with the topic of my PhD on the informal sector in West Africa and we could do the research in the framework of one of the smaller projects (SCUSA).

1.2 Three big and three smaller research projects

How did we get involved in research into the effects of the MDGs and the possible other sources of finance? Through some of the big research projects I was involved in. Three big research projects dominated these 12 years, followed by three small ones, but each time the issue of the role of private sector involvement was studied (Table 1). A lot of the evidence

### Box 1 The definitions of MDGs and SDGs?

The eight Millennium Development Goals (MDGs) – which range from halving extreme poverty rates to halting the spread of HIV/AIDS and providing universal primary education, all by the target date of 2015 – form a blueprint agreed to by all the world’s countries and all the world’s leading development institutions. They were formulated by the United Nations at the beginning of the 21st century. They have galvanized unprecedented efforts to meet the needs of the world’s poorest.

The Sustainable Development Goals (SDGs) was agreed at the 2012 UN Conference on Sustainable Development (UNCSD/Rio+20) by member States to launch a process to develop a set of Sustainable Development Goals (SDGs), which will build upon the Millennium Development Goals and converge with the post 2015 development agenda.
presented in this valedictory speech comes from these projects. In my first 6 years we focused on the drinking water sector and the role of utilities. The two big projects, the first one with Klaas Schwartz (2006) and the second with Marco Schouten (2009) took a lot of our research capacity.

Table 1 Main UNESCO-IHE research projects in which I participated in last 12 years

<table>
<thead>
<tr>
<th>Project/collleague</th>
<th>Theme</th>
<th>Issue of private sector involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>World Bank/ Klaas Schwartz</td>
<td>Best Practices in the utility sector</td>
<td>Mimicking the private sector works?</td>
</tr>
<tr>
<td>European Union/ Marco Schouten</td>
<td>Scenarios for the European water sector</td>
<td>Privatisation or increased private sector involvement?</td>
</tr>
<tr>
<td>EU/Switch/ Peter van der Steen</td>
<td>Urban water management in the city of the future, Eco-cities?</td>
<td>Contribution of households and the government to green cities</td>
</tr>
<tr>
<td>DUPC/Scusa/ Jan Willem Foppen</td>
<td>Addressing the Sanitation Crisis in Unsewered Slum Areas of African Mega-cities</td>
<td>Public versus private solutions for improved sanitation and groundwater</td>
</tr>
<tr>
<td>DUPC/Proacc/ Stefan Uhlenbrook</td>
<td>The effects of Climate change in the Mekong delta</td>
<td>Initiatives form the farmers &amp; entrepreneurs for climate change adaptation</td>
</tr>
<tr>
<td>DUPC/Probe/ Maarten Blokland</td>
<td>Pro poor drinking water supply</td>
<td>Can the private sector be stimulated to cater for the poor through pro-poor benchmarking?</td>
</tr>
</tbody>
</table>

It was only during the third big project (the Switch project, the city of the future) that the following data changed my mind set:

1. 65% of the urban population in Africa is not connected to a piped drinking water system, or only 35% of the urban population in Africa is connected to modern drinking water systems (Kariuki and Schwartz, 2005).
2. Only 10 to 15 percent of the urban population in developing countries benefits from access to a sewer network according to WUP (2003), the rest has to find private solutions!

The major research question became how do these other people get drinking water or solve their sanitary needs? It turns out the other people depend on ‘private solutions’. They buy or obtain their drinking water. People take initiatives, ranging from going to the river or into the bush, to digging a well or building a toilet, or buying water from some private vendor or paying for some communal toilet. Private solutions, because households take the initiative and often local, small scale, informal enterprises play a role in building, maintaining and sometimes operating these wells, standpipes or shared pit latrines. To summarize:
a. Has PSI in the water sector been successful and why?
b. What is the theory behind it?
c. What is the empirical evidence?
d. Under which conditions can PSI be successful?

I published last year with Caroline Murungi (Murungi and Van Dijk, 2013) a paper on the cost of emptying toilets in Kampala and with three co-authors this year on a comparison of the cost of building and maintaining toilets in the slums of Kampala and Dar es Salaam (Van Dijk et al., 2014). We made three scientific contributions:

1. Looking at shit as an asset, which deserves to be valorised as biogas or fertilizer, but also requiring cost recovery and poor people paying small amounts to make use of toilets, which helps to make the units financially viable (Van Dijk, 2012);
2. Analyzing the production, storage, processing and selling of the resulting compost or biogas as a value chain, where a number of producers are involved and the benefits need to be divided equally (Van Dijk and Trienekens, ed., 2012).
3. Pointing at the importance of a governance structure around the toilets, a care taker, an association, a non-governmental organization (NGO) or a community based organization (CBO), a communal or public structure, which manages formally or informally the revenue flow (from small payments to use the facilities) to deciding on the maintenance and emptying of the pit latrines when necessary (Van Dijk, ed., 2012).

The issues listed in the last column of Table 1 came back during my lectures at UNESCO-IHE (in particular in the successful three week Public Private Partnership (PPP) module, which is also sold as a short course), and in the research and consultancy work in which we were involved. The following table provides some examples of PPPs in the water and urban infrastructure sector.

<table>
<thead>
<tr>
<th>Examples in water sector</th>
<th>Examples in infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk water</td>
<td>Ring roads, toll roads</td>
</tr>
<tr>
<td>Drinking water</td>
<td>Mass rapid transport system</td>
</tr>
<tr>
<td>Sewer system</td>
<td>Ports</td>
</tr>
<tr>
<td>Waste water treatment</td>
<td>Inner city renewal</td>
</tr>
<tr>
<td>Irrigation</td>
<td>Operation and maintenance of sea dike in UK</td>
</tr>
</tbody>
</table>

Students used to be anti-privatisation, although this attitude is not as strong any more as it used to be. Let us first give an overview of the valedictory speech.
1.3 An overview of the valedictory speech

In the title of this valedictory address we have put the tension: SDGs are an international public good and given that governments of poor do not have the money to achieve them, would financing them by the private sector be a solution. I want to tell you seven stories reflecting what I have learned through collaboration with more technical colleagues at this institute:

1. Diving into the MDGs, first studying drinking water, then toilets
2. Toilets are no public goods, but poverty is a global public good
3. The role of an institutional economist in the water sector, using freakonomics
4. An example: How to judge private sector involvement in the water sector
5. We are the private sector, a different definition
6. Conditions for successful intervention of the private sector in water related activities
7. An example: Financing major water defence works in Jakarta privately?

1.4 Diving into the MDGs, first studying drinking water, then sanitation

The relevant MDGs in the drinking water and sanitation sector concern those related to drinking water, sanitation and poverty alleviation. The MDG for sanitation for example is to halve, by 2015, the proportion of people who have no access to basic sanitation. Most of the two billion people currently lacking access to improved proper toilets are poor and need a safe place to defecate. Given financial and institutional bottlenecks for the fulfilment of the MDGs in the water and sanitation sector in Africa, Latin America and Asia the famous Camdesus report already ten years ago suggested that an additional US$ 32 billion per year would be needed to achieve the drinking water and sanitation goals (Winpenny, 2005). We cannot expect these investments to be made by governments and so we have to look for alternative sources of finance: can the private sector help?

The expectations from PSI have been very high. Brown (2002) summarizes them as leading to efficiency gains, PSI would remove politics from the sector and provide access to investment capital. Indeed economists argue that PSI promotes competition, which leads to efficiency gains and lower prices, as we have seen for example in the telephone sector. Different sources of private finance are: bonds, venture capital, shares, loans, etc, each coming with their own rules, procedures and conditions. Table 3 distinguishes the private actors involved in financing, or in the actual construction and management of water works. It shows there are not just several financial instruments but also different delivery mechanisms, but also there are formal and informal actors and mechanisms.
Table 3  Private sector actors: involvement in financing, or the actual construction and management

<table>
<thead>
<tr>
<th>Status/activity</th>
<th>Finance</th>
<th>Construction &amp; management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal</td>
<td>Formal banks</td>
<td>(Inter)national drinking water companies</td>
</tr>
<tr>
<td>Inbetween</td>
<td>Micro-finance institutions</td>
<td>Households, NGOs and CBOs</td>
</tr>
<tr>
<td>Informal</td>
<td>Savings, informal lending, traditional credit</td>
<td>Informal water supply &amp; sanitation: SSIPs</td>
</tr>
</tbody>
</table>

Urban water service providers may be classified as formal or informal. The formal service provider is the official urban water utility provider. Most of the water providers constitute the informal service providers who provide services to consumers not served or underserved by the formal utility provider (Table 4). The table also tries to do justice to the role of NGOs and CBOs.

Table 4  Private solutions for water and sanitation which will be discussed

<table>
<thead>
<tr>
<th>Formal/informal activities</th>
<th>Private finance to achieve the MDGs or SDGs</th>
<th>Build and operate projects/infrastructure with different financing modalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal sector solutions</td>
<td>Ahmedabad sewer system through bonds</td>
<td>Waste water treatment in Harnaschpolder by a BOT through a consortium</td>
</tr>
<tr>
<td></td>
<td>Jakarta drinking water or sewer investments, possibly the dike through bonds</td>
<td>Jakarta mass transport system, drinking water, waste collection &amp; ring road</td>
</tr>
<tr>
<td>Informal sector solutions, very wide spread</td>
<td>Households building toilets, sometimes shared</td>
<td>Communities managing toilets</td>
</tr>
<tr>
<td></td>
<td>NGOs improving water and sanitation</td>
<td>Private companies running toilets (Sulabh type of facilities)</td>
</tr>
</tbody>
</table>

My guess about the importance of these different actors is given in Table 5.

Table 5  Relative importance of these sectors, a subjective estimate based on Kampala

<table>
<thead>
<tr>
<th>Status/activity</th>
<th>Finance</th>
<th>Construction &amp; management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Inbetween (NGOs &amp; CBOs)</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Informal (households &amp; micro &amp; small enterprises)</td>
<td>50</td>
<td>85</td>
</tr>
<tr>
<td>Government</td>
<td>35</td>
<td>5</td>
</tr>
</tbody>
</table>
2

What are public goods and global public goods?

What is a public good? I made the intriguing statement that toilets are no public goods, but poverty is. Let me first explain what a public good is and that the only real public goods left at the national level seem to be security and the physical environment and that the new challenge is to deal with international or global public goods, such as the SDGs, our joint responsibility for poverty eradication and minimum service delivery in poor countries and of course human rights, democracy and good governance, topics I will not discuss.

Kaul et al. (eds, 2003) argue in favour of international global public goods and although their list is longer than my list. I consider the international environment, poverty alleviation and peace as the most important global public goods. A real challenge is to deal with international public goods, such as the SDGs, and in particular our joint responsibility for poverty eradication and minimum service delivery in poor countries. I once worked as a development worker trying to help providing national public goods, in my case full employment in Africa (1973-77 for the ILO), but I am now more of an expert contributing to the achievement of international public goods such as a better environment and less poverty by doing research and clarifying how the causal relations go, for example in the case of climate change (Hao Li and Van Dijk, 2012).

Economists distinguish public and private goods, referring to two criteria. Purely private goods would be provided through markets, while in the case of a public good the government plays a role. Economists will argue that the market is efficient to provide these goods, although there are sometimes market distortions, for example through the wrong policies in the past, which may have led to market failure, meaning the private sector did not come forward to undertake these activities. On the other hand we often see government failure in the sense that the government was also not able to provide these services. As an institutional economist I know the market is not functioning in an institutional vacuum, hence we need to analyze the impact of all kinds of rules and regulation on the functioning of the market. They influence the equilibrium price.

In economics a good is a public good, if nobody can be excluded from consumption (exclusion criterion) and consumption by one person does not diminish what is available for someone else (rivalry criterion). This is not the case for water, which I consider hence as a private good. The fire house and the fire brigade would traditionally be examples of public goods. In the meanwhile we have private communication solutions (GSM based) for big
ships and private fire brigades in the Shell refinery. Most ‘traditional’ public goods are no longer public goods. Take the police, we now have private security guards. My conclusion is that at the national level there are no pure public goods left, except probably the safety and the environment.

Being a public good determines for economists the role of the government. It determines who should provide it, the government or the private sector. However, I will argue that even if the government should be involved (preferably as the regulator), the actual provision can be left to the private sector, or better with a lot of PSI. Water, according to these criteria is not a public good, because its availability for drinking water is limited and you could exclude people (disconnect them). In fact you can and should charge them a fixed rate or preferably a tariff per m³ to limit their consumption and assure financially sustainable drinking water supply and sanitary services. Even if you think water is a public good (Savenije and Van der Zaag, 2011) I will argue that it does not imply that the government has to supply it, but rather that the government should facilitate supply and regulate the private sector supplying it.

Besides arguing that water is largely a public good (Hellegers, 2011), others argue it is a social good (United Nations, 1992), or a political good requiring a political economy approach (Schwartz and Schouten, 2006, see box 2) or a human right (UNESCO, 2009). The right based approach to development (Sen, 2009) is politically attractive but may lead to a passive attitude on the part of the population: let the government be responsible for the problem.

**Box 2  Water a political good?**

Schwartz and Schouten (2006) focus on under investments in the water sector. This is an example of market failure. After an original government failure the market does not take up this responsibility, although some liberalisation and decentralisation may make this possible, hence they argue it is a political good. Opschoor (2006) argues that contrary to Schouten and Schwartz there is no need to call water a political good, except may be for advocating purposes.

I find it difficult to argue as an economist that water is any of this and consider it rather an economic good, requiring social considerations (see below: drinking water for the poor). Already in 1992 the UN declared water has an economic value in all its competing uses and should be recognized as an economic good (also OECD, 1987, 2011, 2012), because the utility needs to make an effort to get it to your house in the right quantity and with the right quality. For that reason utilities should apply the user pays principle as for any other economic good.
The debate about public or private provision of services to the poor is very much linked to a debate on the role of the state (Skelcher, 2000). In my view the state is primarily responsible for regulation as a solution for many problems arising from private sector involvement, for example forcing the private operators employed in the publicly owned drinking water utilities to also cater for poor people, a point I will elaborate below. This leads to some considerations concerning the role of an economist in the water sector. I hope to have shown that in the case of MDGs economists can help to calculate the cost and benefits of different technological and governance options to achieve these goals (Van Dijk, ed. 2012), while in the case of the public goods discussion we can contribute by defining public goods and checking to what extent they exist at the national or the international level.

Opschoor (2006) rightly asks the question whether market mechanisms can be relied upon to generate the correct price for water, and whether the water sector can be privatized. I will argue that under the right conditions and regulation private sector involvement is possible and desirable. The private sector can make a contribution to achieving the SDGs. Some of the conditions concern the issue: how to deal with poor consumers! Before getting to this topic I first wish to discuss the role of economics in the water sector, a topic I have been struggling with during the last 12 years (Van Dijk, 2003 and 2011a).
3

Economics in the water sector

3.1 Philosophical debates about social justice

To understand what economics can contribute to water management it is important to know 
what economics really is and which tools it can provide. The easiest definition of economics 
is allocating scarce resources. Economics helps to answer questions like: why are we doing 
this and what do the alternative options cost? For an economist the possible solutions are 
translated into options and the economist would like to help the politicians to make the best 
choice, maximizing welfare or well being at the level of the society.

In these 12 years at UNESCO IHE I had many debates with my technical colleagues, who 
all have an opinion on the role of economics in the water sector. My approach was to show 
what economics can contribute to the debate on water and sanitation. I look at economics as 
a kit of methods and tools and as a normative science which can also provide assistance in 
solving distributional issues, because its institutions are based on shared norms and agreed 
decision rules.

I now want to look at the contribution of an economist to water and sanitation issues. I have 
taught hundreds of UNESCO-IHE students the basic elements of economics. Economics 
is usually defined as the science of scarcity, which requires markets to allocate goods and 
services in an optimal way. Economists basically argue that there is a supply curve (showing 
the higher the price the more producers want to sell), while the demand curve reflects the 
behaviour of the consumers who will buy less if the price is high. The intersection of these 
two curves gives you the market equilibrium the quantity bought at the corresponding price 
(I used my arms to illustrate this equilibrium). The neo-classical economists argue that 
everybody is better off with this market price, although economic theory has little to say 
about the resulting income distribution.

However, Rawls (1971) provides a theory of justice. Two criteria can be derived from his 
theory for distributional issues, but they may not have been sufficiently elaborated to provide 
the justification that water for the poor needs a different approach (the girl is different). My 
point is not that the girl is different, but that in this sector many poor people cannot afford 
the official formal solutions and hence rely on informal suppliers and solutions.

However, there are also arguments to treat poor people differently. The argument runs 
parallel to Sandel’s argument for affirmative action. Sandel (2010) provides a philosophical 
argument in favour of affirmative action, which could also be applied in the water sector.
He argues that society may pressure institutions to formulate a mission, in his case racial integration in universities in the United States (US). There are certainly arguments in the case of developing countries to do the same for supplying water to the poor. Subsequently this mission can be imposed to the private enterprise running the utility on behalf of the government. The experience shows that organizations like SUEZ and Vivendi are willing to do so, if it is part of their contract and they can still charge realistic tariffs to other customers.

Sandel (2010) worries about the moral limits of the market. Can we leave water to the market. The colleagues mentioned (Savenije and Van der Zaag, 2011) and more recently Hellegers (2011) do not want to leave water to market forces alone. I will argue that you need institutions to influence the outcome of the market process and that such institutions are usually developed (say the water boards in the Netherlands) and reflect the moral values of the society at that moment (for the water boards that used to be: who contributes will also decide).

A better basis to pay special attention to poor consumers can be derived from philosophy. Siedentop (2013) argues that the roots of western liberalism can be found in in the idea of ‘moral equality’ among human beings. This idea is strongly associated with Christianity. Siedentop (2013) claims ‘liberalism rests on the moral assumption provided by Christianity’ and Abulafia (2014) notes that the liberal ideology that has proclaimed itself to be staunchly secular, has forgotten its Catholic origins. It would mean that already in the middle ages, rather than in the Italian renaissance the discovery of the individual started. The discussion is not directly relevant for this valedictory, except that it makes us realize that the extreme of libertarians (which seem to be on the rise again in the US; Luce, 2014) has deep roots in the US, but also moved away from its roots, when it no longer accepted that if everybody is equal these people also have the right to a decent life, including minimum provision of basic services, which would also be an implication of Rawl’s social philosophy and Sandel’s practical elaboration.

3.2 What economics really is and which tools it can provide

To understand what economics can contribute to water management it is important to know what economics really is and which tools it can provide. Economics helps to answer questions like: Why are we doing this? What are the alternatives? What sacrifices do we have to make for this option? Does it work? For an economist these concerns are translated into options and the economist would like to help to determine the best choice, taking as point of departure what would mean least cost to society. The purposes of economic analysis are three-fold:

1. To simplify the nature of the choice to a level that we can comprehend (positive theory)
2. To enable us to understand the key elements of that choice (normative theory).
3. To communicate that understanding to all stakeholders so as to form a framework in which they can debate, argue and negotiate their concerns

The easiest definition of economics is ‘the study of the economy’. Other definitions are given in box 3.

**Box 3  Four definitions of economics can be given, economics is:**

1. “The science which traces the laws of such of the phenomena of society as arise from the combined operations of mankind for the production of wealth, in so far as those phenomena are not modified for the pursuit of any other object” (Mill, 1848).
2. “The science which studies human behaviour as a relationship between ends and scarce means which have alternative uses” (Robbins, 1935)
3. “The study of how men and society end up choosing, with or without the use of money, to employ scarce productive resources, which could have alternative uses, to produce various commodities and distribute them for consumption, now or in the future, among various people and groups in society” (Samuelson, 1970)
4. “The application of reason to choice” (Green and Newsome, 1992)

The economy is then defined as the social organization whereby resources are converted to intermediate products, capital stock or final consumer products. This does not help much to understand how economics can help in the water sector. Another definition of economics is allocating scarce resources. It is not just the science of the market, but can also deal with distributional issues (Pen, 1971) and the behaviour of economic actors (Thaler and Sunstein, 2008). My preferred definition of economics is based on Russel (1954): “the use of reason linked to the choice of means to some end”. This would lead to my preferred definition of economics: economics is about dealing with scarce resources, which implies using tools to make a rational choice between alternative uses of these scarce resources.

I can now also give my definition of water economics. Parallel to the definition of economics one could say: water economics concerns the economics of the water sector. However, I prefer a definition which is more instrumental: water economics deals with issues in the water sector using the tools of economics to use reason to make choices between different options, which require scarce resources, in particular the available water resources or the environment. For water economics it is important to understand the behaviour of the major actors.
3.3 Institutional economics

An important distinction in economics is between neo-classical (main stream) economics and institutional economics (Table 6). One can also reproach neo-classical economists that their conclusions are often sterile. There have been many critical authors about neo-classical economics. Schumpeter (1942) reproaches neo-classical economics to pretend that it is a value free science able of being objective. The most important critique comes from the institutional economics (North, 1999), who pointed to the importance of institutions, which regulate the functioning of markets, while neo-classical economics assumes an institutional vacuum.

Table 6 Different layers analyzed in institutional economics

<table>
<thead>
<tr>
<th>Level: four different layers</th>
<th>Purpose of each layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Embeddedness: informal institutions, customs, traditions, norms and religion</td>
<td>Often non-calculative; spontaneous, based on social theories</td>
</tr>
<tr>
<td>2. Institutional environment: formal rules of the game, especially property (polity, judiciary, bureaucracy)</td>
<td>Get the institutional environment right; first order economizing (for example defining property rights)</td>
</tr>
<tr>
<td>3. Governance: the way the game is played, especially aligning governance structures with transactions</td>
<td>Get the governance structure right; second order economizing (designing institutional arrangements)</td>
</tr>
<tr>
<td>4. Resource allocation and employment (prices and quantities: incentive alignment)</td>
<td>Get the marginal conditions right; third order ecclassical theories</td>
</tr>
</tbody>
</table>

If neo-classical economics is more or less familiar to people reading the newspaper (or from Samuelsson, 1970), institutional economics requires some more explanation. According to Adam Smith, the classical economist par excellence, competition serves the public interest. It leads to specialization and distribution of labour which increases the productivity of an enterprise. I agree with this statement, but still like to argue in favour of paying attention to the role of institutions, in particular in those markets which do not function well.

The issue of the value of water can show the difference between these two schools in economics. It is important to distinguish the price paid in the market and the subjective value of a good or service. In the past value was based on the object. The real classical economists (Smith, Ricardo and Marx) considered the value of a good to be the result of the labour put into it (labour value theory). Currently value is considered instrumental value (or imputed value), it is linked to the possible use of the object. Green (2003) gives an example of this ‘imputed value’. You can buy a hat to be beautiful or to avoid catching a cold! These are examples of the functional value of a hat. Other things that have a value may not have a price (your child for example).
Institutional economics is about the role of institutions and attaches an important role to the government in the functioning of the economy. Scott (1995) gives a definition of institutions as consisting of: “cognitive, normative, regulative structures that provide stability and meaning to social behaviour”. Institutions are rule-based and Green (2003: 46) points to the fact that they have geographical and functional boundaries. Examples are share cropping arrangements in Bangladesh or the functioning of water boards in Egypt. Table 6 shows that their role can be analyzed at four different levels. The challenge is to assess the institutional effectiveness of different institutional arrangements.

The idea of institutional economics is that institutions influence the resource allocation process, while neo-classical economists will say that the market does the job and solves all problems. Neo-classical economics likes to limit the role of the government, while in institutional economics there is an important role for the government in defining the rules of the game (legislation) and seeing to it that the rules are implemented.

Table 7 summarizes the major differences between neo-classical and institutional economics. Both emphasize different issues, different motivation of the major actors and make other assumptions to explain the functioning of an economy. Finally, the two schools have different limitations and look differently at the future. On the one hand, the neo-classical economists will see busts and booms as part of the dynamics of the capitalist system and point out that it may mean spoiling scarce resources, because a lot of firms go bust and disappear, but the best ones survive.

On the other hand institutional economics will point to the importance to maintain certain institutions or to change them in a careful way. Typically the reaction to the last financial crisis by the two schools is very different. The neo-classical economists were happy to see the financial sector being bailed out and to notice that they could continue their culture of paying big bonuses and high salaries, while institutional economists argued that the government should improve regulation to avoid another crisis and to limit excessive risk taking and payment of big bonuses in the financial sector. Financial regulation at the national and the international level was their key suggestion and the United States did exactly that at the national level and the European Union at the European level, even if it meant that other financial centres (on the Bahamas, in Singapore or Hong Kong) would become more competitive (although also more risky because less regulated).

Neo-classical economics also analyzes how collective choices are made and assumes the ‘homo economicus’, who is acting in a rational way. The theory assumes that we have all ordered utility functions and that utility and profit maximisation can be the basis for decision making. By expressing our demands in the market the optimal level of production is achieved if the marginal benefits of producing one more unit equal the marginal cost (the price to be paid) for that product. Before dealing with the tools of economics we will first
list some of the major issues in the water sector. It should be noted that most economists have dropped the ‘homo economicus’ and prefer studying the behaviour of consumers and producers. When reviewing for the Dutch Science Council (NWO) the young talents in economics and business studies in 2012 I noted that almost every proposal referred to behavioural economics, emphasizing the need to empirically study the behaviour of the actors in the economic process.

### 3.4 Economics as a normative science

Economic thinking has penetrated our daily life in at least three ways:

1. The emphasis on efficiency, comparing cost and benefits.
2. The conviction of many liberals in the Dutch sense of the word, that we should leave more to markets which would help to achieve this efficiency.
3. Commercialising activities, which were not commercial before. Sandel (2012) gives the example of signatures given by famous sportsmen for which you have to pay in the US and asks the question: what are the moral limits of the market?
For Adam Smith (1759) economic thinking should not just be about the market (the invisible hand) or the wealth of nations, but also about moral sentiments, the title of his earlier book.\(^8\) Well functioning markets require a number of assumptions, which are not always realistic, such as:

1. Rational behaviour of all the economic actors: Consumers are maximizing their utility and entrepreneurs their profit
2. That all the major factors influencing a decision can be expressed in quantitative terms (investment climate, trust, corruption, power, etc.)
3. That there is no market failure, nor government failure
4. The actors operate in competitive markets: several providers and several consumers for water and sanitation services. The markets are not monopolistic or characterized by oligopolies
5. All actors have full information
6. The economic system tends to equilibrium
7. The income distribution is given

On top of that neo classical economics suggests a number of mechanisms to function

8. Markets are not dynamic, but clear
9. There is an invisible hand, but there may just be friction unemployment, and
10. There are continuously trends towards developing monopolies, hence a competition authority is required
11. That every supply will create its demand

There is a strong trend to make economics again the science of what is the good life.\(^9\) According to Thomas Sedlacek (2012) economics is basically the science of good or bad. Is the human race altruistic or egoistic? Is it good or bad behaviour rewarded in economic sense? He considers economics a normative discipline based on cultural constructs embodying a philosophy, or a look at life.\(^10\) Smith’s theory of moral sentiments provides a basis for a more normative approach to economics,\(^11\) I will however rely mainly on Rawls (1971) and Sandel (2012).

The change in the thinking of economist, moving from dealing with moral sentiments to being concerned mainly about collective (and later individual wealth) started at the end of the 19th century, when economic activities and moral values were more and more disconnected and the ambition became to become an objective science, just like the natural sciences. According to Smith these moral sentiments would be based on ‘sympathy’ (feeling with others, or the compassion of Nussbaum, 2001) or on a ‘multitude of psychological motives’.\(^12\)
A big issue in water and sanitation is the needs of poor people, who tend to be excluded in the case of market solutions. Criticizing economics may be summarized as: is the human being at the centre of the attention, or is his/her role reduced to some assumptions about the rationality behind her/his behaviour? In economics, but also in management science a (wo) man is reduced to a rational being maximizing her/his utility as a consumer or profit as an entrepreneur.

Sedlacek (2011: 183) considers modern economics a typical product of the western civilisation where material wellbeing is very important and ‘ethics has disappeared from mainstream economic thought’. According to the classical philosophy (Aristoteles, see Sandel 2010: chapter 8) we should analyze the good life. However, Mandeville (1770-1833) has turned the argument around when he concluded from his fable of the bees that the more vices there were, the more material well-being there could be. This applies for entrepreneurs. However the NRC (30-11-2012) rightly concludes that also consumers behave differently by borrowing on a large scale. This was the case in the US, where it caused the financial crisis. What we have learned from that crisis is that its not only European governments that took up the habit of excessive lending, but also European citizens.

The economic crisis of 2008 has triggered a debate whether economics has more to offer than prescribing liberalisation, leaving it to the market and suggestions to keep your budget and balance of payments in equilibrium. The growth models of the neo-classical economists are all based on releasing market forces. Neo classical macroeconomics has been criticized heavily for not predicting the 2008/9 financial and economic crisis. However, since the 2008 crisis there is also more space of other approaches.

Finally economics has to deal with externalities: the cost or benefits that relate to water service but are external to the utility or private company providing water and or sanitation and are not part of the utility’s cost or benefits of its services. This is a problem, because economists have not really managed to incorporate all these externalities in the price of water, or of the environment. That would have been the solution and that is exactly why environmental economists in the 1970s suggested taxes or other charges to cover the cost of pollution (Opschoor, 2006).

The definition of economics has changed over time, where Samuelson (1970) in his famous text book economics defined as the world of prices, wages, interest, shares, bonds, banks, credit, tax and expenditure Levitt en Dubner (2009) define economics as ‘the study of incentives’ and how they influence behaviour.
3.5 From institutional economics to freakonomics

I am a strong believer in institutional economics (Van Dijk ed., 2012) but also ventured to approach water issues with the methods of freakonomics (Van Dijk, 2011b). The latter is an original approach to deal with topics using economic tools, but not necessarily the whole toolkit of economics.

**Box 4 What is freakonomics?**

Levitt and Dubner (2005, 2009) wrote two books on **freakonomics** and work on a third one which will deal explicitly with their methods. Levitt and Dubner don’t take things at face value, but try to understand what is really happening. They call themselves rogue economists exploring the hidden side of everything (the subtitle of the first book). In the epilogue of the second book the authors call their work themselves microeconomics. Freakonomics focuses on incentives that drive decisions and disincentives due to regulation.

Source: Van Dijk, (2011b).

I combined the issue based approach to water economics with the methods of freakonomics (Van Dijk, 2011b). Levitt and Dubner consider that people react to incentives. Hence according to freakonomics and behavioural economics understanding how incentives work are the cornerstone of modern economics. Table 8 summarizes the differences between freakonomics and neo-classical economics.

**Table 8 The distinction between Freakonomics and Neo classical macroeconomics**

<table>
<thead>
<tr>
<th>Neo classical macroeconomics</th>
<th>Freakonomics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using quantitative models</td>
<td>Using statistical material in an intelligent way</td>
</tr>
<tr>
<td>Assuming rational behaviour, full information and working markets</td>
<td>A minimum of assumptions</td>
</tr>
<tr>
<td>Based on correlations, which are inversed to come up with policies</td>
<td>Go against the ‘conventional wisdom’</td>
</tr>
<tr>
<td>Includes only economic variables</td>
<td>Redefine the issue to make it relevant</td>
</tr>
<tr>
<td>But: could not predict the 2008/9 crisis</td>
<td>Not limited to economic variables</td>
</tr>
<tr>
<td></td>
<td>Emphasizes the importance of incentives, with sometimes unexpected effects (high bonuses leading to the financial crisis)</td>
</tr>
</tbody>
</table>

Source: Van Dijk (2011b).

More fundamentally I consider that Levitt and Dubner usually start with a redefinition of the problem to allow us to get a different perspective on it. Subsequently they follow a
strictly empirical approach and do not need to make all the assumptions of neo classical economics. Moreover they are interested in the real causality and they manage to solve a number of interesting questions. Finally, they don’t mind using other people’s empirical material if they can use it for their argument. Box 5 summarizes the implicit methodological approach.

---

**Box 5** The implicit methodological approach of Freakonomics

- Put an agent in the centre: the consumer, the producer, the utility, the government, the regulator
- Identify which incentives affect this agent
- Frame the issue differently
- Develop a theoretical framework
- Provide empirical evidence
- Indicate that conventional wisdom does not apply but a different causality
- Come up with a different explanation showing how the incentives and disincentives affect the behaviour of the actors and provide a fresh look on the issue

Source: Van Dijk (2011b).

---

Box 6 gives some examples of issues that could be analyzed with a freakonomics approach.

**Box 6** Some examples of Freakonomics in the water sector

- Current natural resource pricing policy does not reflect their true cost (scarcity): the cost of degrading the eco system are not included and hence this leads to unsustainable production
- Virtual water remains very virtual for a Freakonomist, otherwise Ethiopia would not export any coffee anymore (currently good for 40% of the foreign exchange earnings; Financial Times, 2014)! (versus Hoekstra, 2013)\(^1\)
- Private sector involvement should not just be judged in terms of lower prices for water (Marin, 2009, see below)
- Separating grey water in China should make economic and financial sense (Liang and Van Dijk, 2010)
- There are only political arguments for river linking projects in China (a point substantiated in my lectures for HOVO at Erasmus University, 2012)

Source: Van Dijk (2011b).
During the farewell of Arthur Mynett at Deltares I have used this issue based approach among others to argue for another way of organizing water management in the Netherlands, the water boards as provincial services (Van Dijk, 2011b). The water boards may have outlived their mission and the EU now prescribes a different way of organizing water management in the Water Framework Directives. The emphasis is on trans border river commission. The tasks of cleaning the waste water is not necessarily one for the water boards, nor do most cities want them to maintain their sewer system. Let me give one example in this valedictory speech: how to judge privatisation (the PSI version of it) in the water sector.

3.6 Cost and benefits of different technological options: an issue based approach

The EU supported Switch project about the city of the future was concerned with a different way of Integrated Urban Water Management (IUWM) suggesting a series of technological solutions such as:

1. Rain water harvesting
2. Separating grey and brown water
3. Sustainable urban drains
4. Refilling aquifers
5. Transition management

I was always asked what are the major financial and economic issues in IUWM if such technological suggestions are implemented? Box 7 summarizes the major issues for an economist dealing with urban water and sanitation problems.

<table>
<thead>
<tr>
<th>Box 7</th>
<th>Major issues for an economist dealing with urban water and sanitation problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>How to assess the cost and benefits of different technological options (such as rainwater harvesting or separating grey and brown water) over a longer period of time (Liang and Van Dijk, 2011)?</td>
</tr>
<tr>
<td>2.</td>
<td>How to compare the cost and benefits of different options?</td>
</tr>
<tr>
<td>3.</td>
<td>How to obtain finance for different proposed solutions?</td>
</tr>
<tr>
<td>4.</td>
<td>How to recover the cost? (tariffs, betterment or property tax, connection fees, etc.)</td>
</tr>
<tr>
<td>5.</td>
<td>What is the institutional framework necessary to achieve this?</td>
</tr>
<tr>
<td>6.</td>
<td>What is the value of water or the environment?</td>
</tr>
</tbody>
</table>
Once we know the issue and we have knowledge about the economic and financial tools available we can think of combining the two. An example of this suggestion is given in Table 9. It lists the most frequently used economic and financial methods and tools for urban water management, linked to an important issue. The importance of the social, institutional and regulatory context in which IUWM is promoted. IUWM takes place in a certain context and that context needs to be taken into account. It was argued that institutional economics can help to analyze the functioning of this context and can show how institutional arrangements influence the allocation process.

**Table 9  Theories, methods and tools for urban water management issues**

<table>
<thead>
<tr>
<th>Issue</th>
<th>Methods (more abstract)</th>
<th>Tools (more concrete)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required water governance structure in a decentralized water or waste water system?</td>
<td>Action and strategic planning</td>
<td>Integrated problem analysis</td>
</tr>
<tr>
<td></td>
<td>Economic and financial analysis (cost benefit analysis) of proposed structures</td>
<td>Ways to organize the participation of stakeholders</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environmental management tools</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Determine the resulting cash flow</td>
</tr>
<tr>
<td>Increasing the water related productivity of industries or agriculture</td>
<td>Research methods to assess productivity</td>
<td>Assess the cost and benefits of private finance for investments</td>
</tr>
<tr>
<td></td>
<td>Systematic monitoring and evaluation</td>
<td>Using IT for constant monitoring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Develop integrated solutions</td>
</tr>
<tr>
<td>Possibility of achieving a higher efficiency of utilities by using the New public management theory</td>
<td>Policy analysis</td>
<td>Institutional analysis</td>
</tr>
<tr>
<td></td>
<td>Planning of reforms Monitor and evaluation</td>
<td>Planning administrative reform</td>
</tr>
<tr>
<td></td>
<td>Comparative analysis</td>
<td>Monitoring the results and using benchmarking systems</td>
</tr>
</tbody>
</table>


Figure 1 illustrates how different disciplines can contribute to understanding water related issues. The institutional context sets the conditions for successful IUWM.

Economics can help because it can analyze the positive and negative effects for society as a whole through a societal cost benefit analysis. It is important to be very precise about all possible costs and benefits of a certain scheme. It is not always easy to quantify these cost or benefits, but they should be listed. Sometimes alternatives for the CBA are available such as cost effectiveness methods and Life cycle costing, in particular when it is difficult to estimate all the future benefits.
Management is important when ideas need to be implemented and day to day activities are important.

The bottom line is the financial analysis, using an analysis of the cost and benefits in financial terms for the investor or a household to adopt a certain technology. All major actors involved (the government, the private sector and the households) use financial analysis and management techniques to make ends meet. Sometimes the CBA and the financial analysis provide almost the same results. If the number of factors taken into account is limited and the deviation between the market price and the shadow price is small the results of a cost benefit and a financial analysis come very close. This was the case of calculating the benefits of rainwater harvesting, while in the case of wastewater reuse the number of external effects of centralized systems was very high and hence the difference with the outcome of the financial analysis can be substantial (Liang and Van Dijk, 2010 and 2011).

3.7 Economic, financial and management tools for IUWM

What are the available economic and financial tools for IUWM? Table 10 gives a list of tools provided by different economic and management disciplines, ranging from using an institutional perspective to zooming in into the financial aspects. However there may be more tools, in particular if related disciplines are taken into account.

3.8 The challenge: integration of economics and technical sciences

The main financial and economic issues in IUWM have been listed and a framework for integration of economics and technical sciences is suggested, by linking the issues to
Table 10  Different economic tools for IUWM from different disciplines

<table>
<thead>
<tr>
<th>From an institutional perspective</th>
<th>From economics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Carry out an institutional analysis: which institutions can be found locally and how do they function?</td>
<td>1. Demand and supply curves to determine a price</td>
</tr>
<tr>
<td>2. It is important to achieve multi stakeholder involvement and popular participation</td>
<td>2. Cost benefit analysis (IRR or NPV)</td>
</tr>
<tr>
<td>3. Analyze the effectiveness &amp; efficiency of institutions</td>
<td>3. Life cycle costing: whole life cycle cost &amp; whole life maintenance cost</td>
</tr>
<tr>
<td>4. Suggest different institutional options to the stakeholders and decision makers</td>
<td>4. Cost effectiveness, if no estimate of the benefits is possible</td>
</tr>
<tr>
<td></td>
<td>5. Multi-criteria analysis</td>
</tr>
<tr>
<td></td>
<td>6. Incorporate external effects in the price of a good or service</td>
</tr>
<tr>
<td></td>
<td>7. Policy impact analysis</td>
</tr>
<tr>
<td></td>
<td>8. Environmental assessments</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>From management</th>
<th>From finance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Action &amp; strategic management</td>
<td>1. Financial analysis</td>
</tr>
<tr>
<td>2. Decision support models</td>
<td>2. Financing options for projects</td>
</tr>
<tr>
<td>3. Planning techniques (scenarios)</td>
<td>3. Cost recovery options</td>
</tr>
<tr>
<td>4. Linear programming</td>
<td>4. Scoring and ranking alternatives</td>
</tr>
<tr>
<td>5. Business plans</td>
<td>5. Financial policies</td>
</tr>
<tr>
<td>6. O&amp;M, HRM and Financial management</td>
<td>6. Effects of (dis) incentives, such as taxes and subsidies</td>
</tr>
<tr>
<td>7. Sectoral, for ex. urban management</td>
<td></td>
</tr>
<tr>
<td>8. Transition management</td>
<td></td>
</tr>
</tbody>
</table>

The economic tools available. The issues are also linked to a number of key technologies suggested in the Switch project for improved urban water management. We can now analyze what this meant in the framework of the Switch project and gives some examples.

These six examples of different issues were studied in Van Dijk (2010) to show how economic tools helped to get a better understanding of the issue. The format for the analysis of the five cases is:

1. What was the issue?
2. Where has it been studied?
3. What are the technological options?
4. Which economic tools have been used?
5. What have they contributed to a better insight in the issue?
**Table 11 Major issues in IUWM in the Switch project and the economics of it**

<table>
<thead>
<tr>
<th>IUWM issue</th>
<th>Major economic tool used</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Reduce urban drinking water consumption</td>
<td>Cost effectiveness of different reduction options expressed in</td>
<td>South African manual of the Water commission</td>
</tr>
<tr>
<td></td>
<td>cost and saved water</td>
<td></td>
</tr>
<tr>
<td>2. Make sanitation more efficient: separate grey and brown water for</td>
<td>CBA, an economic, social and environmental analysis of this</td>
<td>Liang and Van Dijk (2010)</td>
</tr>
<tr>
<td>decentralized treatment</td>
<td>option</td>
<td></td>
</tr>
<tr>
<td>3. Introducing rainwater harvesting (RWH) to avoid using scarce ground</td>
<td>Financial analysis to find out when this would be a viable</td>
<td>Liang and Van Dijk (2011)</td>
</tr>
<tr>
<td>water</td>
<td>option</td>
<td></td>
</tr>
<tr>
<td>4. Transitioning: introducing changes to make rain water harvesting</td>
<td>Analyzing price elasticity to determine how much tax or subsidy</td>
<td>Manual transitioning Switch project</td>
</tr>
<tr>
<td>systems viable</td>
<td>is necessary to make RWH financially viable</td>
<td></td>
</tr>
<tr>
<td>5. Improved and more Sustainable urban drains (SUDs) in times of climate</td>
<td>Use Life cycle costing to choose, because it is difficult to</td>
<td>Transition manual of Switch</td>
</tr>
<tr>
<td>change</td>
<td>calculate the benefits</td>
<td></td>
</tr>
<tr>
<td>6. Sustainable drinking water options for the urban poor</td>
<td>Business plans to identify financing options and cost recovery</td>
<td>Van Dijk (2009)</td>
</tr>
<tr>
<td></td>
<td>systems for piped and non-piped drinking water systems</td>
<td></td>
</tr>
<tr>
<td>Reserve topics to be taken up after retirement:</td>
<td>a. Efficiency of different scales of production</td>
<td>Liang (2011)</td>
</tr>
<tr>
<td>a. Centralized versus decentralized WW treatment</td>
<td>b. CBA &amp; Life cycle costing for integrated economic and</td>
<td>Van Dijk (2010)</td>
</tr>
<tr>
<td>b. Sustainability of eco cities</td>
<td>environmental friendly approaches to urbanisation</td>
<td></td>
</tr>
</tbody>
</table>

A distinction can be made between the following stages in preparing alternative options in IUWM:

a. Research to identify the issue
b. Identifying different options
c. Study the options and compare the data
d. Select one that seems to score best on a number of criteria
e. Implement it
f. Monitor and evaluate to correct the course of action and to provide feedback to the researchers, technicians and social scientists.
Research has taken place for Switch in Beijing and Accra, the capital of Ghana by UNESCO IHE staff and students (Herry Rachman, 2010 and Raymond Luwita, 2010). Van Dijk (2009 and 2010) reported and presented the research to the learning alliance meetings in Accra in 2009 and 2010. A large number of drinking water supply options existed. In Table 12 seven options, the corresponding institutional arrangement, and the possible source of finance and system to recover the cost are listed.

Table 12 Piped drinking water options: institutional arrangement, source of finance and cost recovery system

<table>
<thead>
<tr>
<th>Drinking water option</th>
<th>Institutional arrangements</th>
<th>Source of finance</th>
<th>Cost recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual house connections</td>
<td>Public, private or Public Private Partnership (PPP)</td>
<td>Government budget, but connection fee: could use micro finance</td>
<td>Tariff</td>
</tr>
<tr>
<td>Standpipes, to promote social inclusion</td>
<td>Contract with community or a person indicated by the community</td>
<td>Donors (Water for life for ex.)</td>
<td>GWCL is paid directly, consumers pay vendors</td>
</tr>
<tr>
<td>Water tanks in community with water supplied by GWCL using a private tanker</td>
<td>Water storage with private vendor, one case so far, water from filling point GWCL. Selling bulk</td>
<td>AVRL direct, Evaluated by Trend, selling price of water may increase, but too expensive</td>
<td>Maximum was 5 pesewas per bucket (18 litres), vendor rents tanker and can increase price</td>
</tr>
<tr>
<td>Distribution line providing water in bulk to a community</td>
<td>Manage their own network, not yet, there is just a pilot somewhere &amp; may be tried in Accra</td>
<td>Bulk meter bill to be paid by community</td>
<td>Community paid by vendors or households</td>
</tr>
<tr>
<td>Using pre paid meters</td>
<td>Exists for some industries &amp; SMEs</td>
<td>High investment cost for equipment</td>
<td>Assured, unless people turn against the system</td>
</tr>
<tr>
<td>Private operators using tankers with GWCL water</td>
<td>They often use the filling points of GWCL. This allows quality control</td>
<td>Limited investments, NGO support</td>
<td>Depending on the deal with the local community</td>
</tr>
<tr>
<td>Allowing private connections to sell</td>
<td>GWCL gives 20% reduction for reselling</td>
<td>Private, but limited</td>
<td>Price should not be too different from GWCL price</td>
</tr>
</tbody>
</table>

Source Van Dijk (2010).
GWCL = Ghana Water Company Limited
AVRL = Aqua Vitens Rand Limited.
The economic and financial tools used in this study were preparing good business plans to qualify for loans or other sources of private finance. Not only alternative sources of finance should be part of it, but also solid cost recovery systems. This means at least a financial analysis of the investment and the operations and maintenance (O&M) cost of the proposed option and an estimation of the revenues. To link the idea of tapping alternative sources of finance to the idea that cost recovery is essential if a sustainable system would have to be launched. The report for Ghana did not limit itself to look at piped water solutions, but also studied a number of non-piped options (wells, desalination plant and surface water). An integrated approach has been advocated covering the development of all relevant options simultaneously. However, it was stressed that access to extern and new sources of finance would depend on a business plan with a solid financial analysis showing that the cost recovery system is such that it promises a sufficient cash flow to serve the debt. Blending of aid (grant) money with more expensive commercial funds was advocated, but good cost recovery systems will contribute to the sustainability of the solution chosen.

### Box 8 Most important tools from economics for relevant issues in IUWM

<table>
<thead>
<tr>
<th>Relevant economic issues in IUWM</th>
<th>Most important tools from economics, management and finance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing a strategic vision of the city of the future</td>
<td>Action and strategic planning, integrated water resource planning, scenario exercise</td>
</tr>
<tr>
<td>Allocation problems</td>
<td>Allocation models</td>
</tr>
<tr>
<td>Making choices between different options</td>
<td>Decision support systems, for example for WDM or SUDs</td>
</tr>
<tr>
<td>Estimating future demand</td>
<td>Demand curves, scenarios and other planning tools</td>
</tr>
<tr>
<td>Comparing future cost and benefits</td>
<td>CBA, financial analysis, but also Cost effectiveness analysis, LCC &amp;</td>
</tr>
<tr>
<td>Convincing actors to undertake certain actions</td>
<td>Incentives, subsidies, taxes on unattractive alternatives</td>
</tr>
<tr>
<td>Transitioning to a new situation</td>
<td>A combination of planning and incentives</td>
</tr>
<tr>
<td>Obtaining access to other sources of finance</td>
<td>Develop a business plan and do a solid financial analysis, including cost recovery options</td>
</tr>
</tbody>
</table>

We have listed a number of issues in water management and indicated that different economic tools may help to better understand these issues. In the Switch project different tools have been used for different issues to be solved with different degrees of success. However, later work will always build on the work of earlier research and there is no doubt that an analysis of economic, financial and institutional aspects of certain innovations in the
water sector has added to our understanding of the issues (Howe et al. 2012). Box 8 gives the most important tools from economics for relevant issues in IUWM.

It is very common that a number of economic and financial methods are combined, for example to analyze cross cutting issues, such as the issue of scale, which turned up several times. In that sense Box 8 is a simplification when it tries to link the relevant issues to the most important tools from economics, management and finance.
4 Achievements of MDGs and SDGs: what have PPPs contributed?

4.1 Achievements of MDGs with the private sector?

The MDGs were meant to be achieved in 2015, which is only next year. It is now important to reflect on the result of the MDGs and the possibilities for the SDGs. The most relevant MDGs for the water sector concern the one concerning poverty and those specifically related to drinking water and sanitation. The estimated amounts to achieve water related MDGs range from US$ 2.1 to 23 billion per year and when going beyond the more basic definition of urban service provision will cost even more. If the broader definition of sanitation would be used (including treatment of all municipal and industrial wastewater and solid waste) US$ 100 billion a year would be necessary (Winpenny, 2005). Financially the first option translates into a doubling of investments from $15 billion to $30 billion per year for water supply and sanitation alone. The required long term investments (50 to 100 years) are difficult to finance because in most developing countries a capital market for long term finance does not exist.

The interesting question is why the MDGs are more or less achieved at the global level, but most poor Africans still don’t have access to safe drinking. The answer is one progress in countries like China and India has been such that at a global level these MDGs have almost been achieved. Also within Africa substantial progress has been made with providing collective, communal, public or privately run toilets. The jargon is about the sanitation ladder of the MDGs: from open defecation, via unimproved to shared and finally improved. A problem is that communal and even joint toilets under the Joint Monitoring Program (JMP, 2008) are not considered a contribution to achieving the MDGs (Mehta and Knapp, 2004). JMP (2008) does not count communal sanitation as a solution, because it is not a real safe option for women. However, in the slums of Kampala this is considered the only option (Mwalwega, 2010).

The MDGs have been quite effective in drawing our attention to urgent problems, such as access to urban services by the poor. In collaboration with Maarten Blokland I am involved in a DGIS supported pro poor benchmarking project (PROBE). Many solutions have been tried to deal with poor water consumers and we need to learn more about their success. In the drinking water sector we have come up with the following solutions for poor people:

a. Instruct private operators to cross-subsidize, to help poor people or be forced to write off your claims on them
b. Do not allow poor people who are not paying to disconnect (the labour government in the UK after mrs Tatcher had left)
c. Different tariffs for poor people, for example in the block system the first block could be subsidized or even free. This is the life line approach in Ghana and South Africa, where the first 200 litres per person is provided for free.

d. Standpipes

e. Make PPP contracts “pro-poor”

f. Subsidize connections to help poor people to connect to the grid

g. Micro-savings linked to micro-credit for paying connection fees

h. Santiago de Chile: Municipality reimburses poorest 20 percent large part of their water bills

i. Kampala NWSC pre-paid cards for consumption by the poor at official tariff (Isoko and Van Dijk, 2013)

Let us take a look at the relative importance of private sector involvement (PSI) in the water sector. I always started by explaining my students the difference between privatisation in the sense of divestiture and in the sense of PSI. The latter is much more relevant and raises three kinds of questions that always need to be answered: PSI in what form? PSI may range from a simple service contract to a Design Built Finance & Operate (DBFO) formula and finally, how do we measure the success of such PSI: what are the performance indicators in the contract? Table 11 provides possible criteria to judge PPPs in the water sector from an economic, management and social point of view.

The following figure provides insight in the amounts involved in PPPs, based on Gleijm and Gerdes (2012). We learn from it that there was a dip in the number of deals after the financial crisis of 2008, although with a delay of two years. Secondly, the order of importance is first bank loans, then equity or grants and finally bonds, which are considered private financing, since they are bought by private household and investing firms. Finally loans to governments by international financial organizations such as the World Bank are important. However, increasingly private financial institutions, using different legal forms and financial instruments take over their role. However, this is the global PPP market. The next figure shows us the effect of private investment for water and sewerage per region.

Let us review briefly what privatisation, private sector involvement and PPPs have achieved, in particular what the private sector has contributed to the MDGs so far. Certainly the amounts are not huge concerned with the US$ 100 billion a year that would be necessary according to Camdesus, so we need to be realistic what to expect. Particularly the PPPs in water and sanitation are limited and concentrated in a few geographical areas. For short they are not important in water and sanitation and not in Africa.

Rather than looking at the amounts involved let us look at the results. Private sector involvement achieved what? Better efficiency, external sources of finance or complementary expertise? How do we measure the success of such PSI: what are the performance indicators in the contract? What are the criteria we can use?
Achieving the SDGs: public good with private money?

We can conclude that PSI in the form of PPPs in the water sector is not as important as some people had hoped, but it is still very widespread, despite the broad attention given to the failed cases in Argentina and Bolivia for example. In the United States there seem to be
25,000 privately operated water systems, ranging from small scale community plants to big service contracts for cities like Atlanta.

Marin (2009) looked at delegated management contracts for the short term, while for the longer term he considered four different forms: concessions, divestiture, leases and affermages and mixed ownership companies. He broadened the scope of the evaluation by looking how these projects scored on four criteria:

1. Improved access and expansion of coverage of water and sanitation services
2. Quality of services
3. Operational efficiency of the utility
4. The effect on tariffs

He found that the effects of these PPPs in the studies he reviewed were overall:

- Neutral on access and coverage
- Positive on service quality and operational efficiency
- Inconclusive on tariff levels

However, none of the studies covers all 4 dimensions of utility performance: access and coverage, quality, efficiency and tariffs! Let me give a more detailed account of his findings on each of the four criteria.

**Ad 1 On access and expansion of coverage he found more precisely:**
- More than 24 million people have gained access to piped water as a result of water PPPs
- There was no clear advantage of PPPs for expanding access to basic services over efforts by public water utilities
- Close link between PPP coverage expansion and availability of financing for the necessary investments
- The importance of providing low-cost service alternatives if you want to help poor people
- Factors that are beyond the utilities’ scope for expanding access: illegal settlements, and slum housing, households are not always willing to connect and the impossibility to impose or to subsidize connection costs for new customers

**Ad 2 Concerning the quality of the services: he noted**
- Reductions in water rationing through concessions and leases-affermages
- Increased effectiveness of management contracts in reducing water rationing
- Improved compliance with drinking water standards

**Ad 3 On operational efficiency of the utility Marin (2009) found in general good performance of PPPs in reducing in water losses in Morocco and Sub-Saharan Africa, in Latin America**
(in particular in the case of Colombia) and in Asia. Furthermore a good performance of management contracts in reducing water losses, improvements in bill collection rates in Latin America and in most management projects.

His conclusions on PPPs and operational efficiency are quite positive: a reduction of water losses, improved billing and collection and higher labour productivity. On productivity of the plants and labour productivity he found in particular that in the case of private operators, labour productivity has improved while employment levels went down in the short run, due to overstaffing (in particular in Latin America), but the impact of PPPs on salaries and working conditions is positive. He found for different types of contract operational efficiency of concessionaires, under lease-affermage and management contracts, depends largely on evolution of operational cost and collection rates. For other types of contract operational efficiency most consistently improved because of PSI!

**Ad 4 For tariffs**

The effects on tariffs are not unambiguous. In fact this depended very much on the original level and on the rate of inflation. There are no significant differences with public utilities, but differences per region and differences related to the stage in the contract period.

His final conclusions are important, because some can be considered conditions for success of PPPs:

- Successful water PPPs have been part of well-designed overall sector reforms
- Contracts must be designed with realistic targets
- Establishing a good partnership that achieves tangible results takes time
- Developing countries can have their own private water operators
- Successes stories in Africa (Ivory Coast, Senegal and Gabon) and in Latin America (Colombia)
- Water PPPs are not necessarily more difficult to regulate than public utilities
- Various options are available for a viable regulatory system
- Transparency must be a cornerstone of regulation
- Incorporation of social goals in contracts is important
- Water projects need to be made more pro-poor
- The cost of social goals must be recognized in the design of PPP projects
- Subsidizing of access for the poor should be considered separation of customer tariffs from the remuneration of the operator can have advantages
- The wide-ranging impact of PPPs on labour must be better addressed

Marin’s conclusions are still quite positive: in total according to Marin (2009) 50 million people are successfully supplied by private operators, for 20 million people there are mixed results and for 30 million people medium results, while roughly for 60 million people the
PPPs are ongoing, for 25 million people there was an early end and for 20 million people the contracts were not renewed. He argues in favour of a new generation of PPPs, with a focus on improving efficiency and service quality and various options are possible for securing long term financing through a mix of public and private sources and for hybrid long term PPPs (p141). He concludes that it is time to rebalance the debate! I have taken some time summarizing the Marin study since it is one of the few large scale evaluations of PSI in the water sector in developing countries. Through evaluations like Marin (2009) we have gotten a more realistic picture of what can be expected from PSI and under which conditions it may be successful.

4.2 Private sector involvement analyzed in Freakonomics terms

There are different ways to evaluate the effects of private sector involvement in the water sector, but it is usually in terms of price of drinking water or sanitary services. We argued (Van Dijk, ed., 2008) in terms of an improved institutional setup, allowing further development of the water and sanitation sector:

- Are the necessary investments done?
- Are the MDGs achieved?
- Are the poor included?

Judgment of PSI or PPPS depends on the objectives and the period considered! Most researchers critical about PSI look mainly at two criteria: has the tariff of water increased and has the number of employees decreased (Green, 2003). What would Freakonomics have to say about this issue?

- Frame the issue differently: broader than the others, by taking several indicators of success and provide the results for each of them per type of contractual scheme, region and stage of the contract (like what Marin, 2009 did).
- Provide empirical evidence: Marin (2009) used a great number of existing studies checked on his four measures of success and proves that they are quite successful, contrary to the conventional wisdom
- Show how incentives and disincentives affect the behaviour of the actors: the private operators want to continue working and they know that they have to score on a number of indicators, including the pro-poor activities undertaken.
- Come up with a different explanation: also point to other agreements made, besides making a profit and selling the water cheaply: access and coverage, quality of the services and operational efficiency.
- Indicate that conventional wisdom does not apply but a different causality: the established idea is that PSI would lead to more investments and higher O&M expenditures, which
would increase the sales and in the end the profit. I would personally add that just the change in management probably already has a positive effect on the performance of utilities using private partners.

The right reaction to more PSI has been more regulation, just like what is happening in the financial sector at present. Politicians openly debate whether certain liberalisations need to be reversed. The trits of liberalisation, unbundling and innovation, which I advocated in my inaugural address at this institute (Van Dijk, 2003) is not as self-evident anymore. The economist will say that competition stimulates innovation and could lead to more efficiency and maximum welfare for all people concerned.

Table 13 Possible criteria to judge PPPs in the water sector

<table>
<thead>
<tr>
<th>Economic &amp; financial criteria</th>
<th>Management criteria</th>
<th>Social criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tariff level of water and or sanitation</td>
<td>Regular drinking water supply has improved</td>
<td>Poor are being connected</td>
</tr>
<tr>
<td>New investments have been made for extension of the network</td>
<td>More customer orientation</td>
<td>Poor people are being served</td>
</tr>
<tr>
<td>Non revenue water has gone down</td>
<td>More market orientation</td>
<td>Water supply has taken cultural conditions into consideration</td>
</tr>
<tr>
<td>Introduced competition in the sector</td>
<td>Promoted unbundling</td>
<td>Improved sanitation has taken cultural conditions into consideration</td>
</tr>
<tr>
<td>Reorganization has made utility more efficient</td>
<td>Technological innovations introduced</td>
<td>Improved transparency of utility performance &amp; decisions</td>
</tr>
</tbody>
</table>

Access to water and sanitation by the poor has certainly been a recurrent theme during these 12 years at UNESCO-IHE. For me it does not mean that the supply of such services necessarily has to come from the government. The scenario studies of the European water market that Marco Schouten and I did for the EU (Schouten and Van Dijk, 2010) showed

Table 14 Example of PSI by government owned utilities in Europe

<table>
<thead>
<tr>
<th>Technical activities through Service contracts</th>
<th>Management activities through Management contracts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design of new treatment plants</td>
<td>Customer care</td>
</tr>
<tr>
<td>Operation &amp; management activities</td>
<td>Factoring (sending &amp; cashing of bills)</td>
</tr>
<tr>
<td>Car and truck repair</td>
<td>Call centers</td>
</tr>
</tbody>
</table>

Source: Schouten and Van Dijk (2010).
that complete privatization (divestiture) was the least likely one, while PSI was very likely and already happening on a large scale. Many European water companies have outsourced almost everything (Table 14).

I keep telling our students that even at UNESCO-IHE we hire security guards, a cleaning company and catering services. Outsourcing it also quite common in the public sector!

### 4.3 Different financial instruments and delivery modes

PSI in what form? PSI may range from a simple service contract to a Design Built Finance & Operate (DBFO) formula. Different sources are: bonds, venture capital, shares, loans, etc, each coming with their own rules, procedures and conditions. A number of financial instruments have already been mentioned. Van Dijk (2006) provides a list of more traditional versus unconventional financing instruments (also Table 15).

#### Table 15 Example of PSI by government owned utilities in Europe

<table>
<thead>
<tr>
<th>Financial instruments</th>
<th>Delivery modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loans</td>
<td>Outsourcing and subcontracting</td>
</tr>
<tr>
<td>Bonds</td>
<td>Make use of service contracts</td>
</tr>
<tr>
<td>Stocks</td>
<td>Use management contracts</td>
</tr>
<tr>
<td>Using development funds</td>
<td>Build Operate &amp; Transfer (BOT), but also</td>
</tr>
<tr>
<td>Using development banks</td>
<td>Build Operate &amp; Own (BOO)</td>
</tr>
<tr>
<td>Using micro savings and micro credit, for paying for example for water and sewer connections</td>
<td>Build Operate Own &amp; Transfer (BOOT) and Build Operate &amp; Lease (BOL)</td>
</tr>
<tr>
<td>The use of 'project development' finance (based on a feasibility study and not on an underlying guarantee)</td>
<td>Design Built Finance &amp; Operate (DBFO) formula in all its varieties</td>
</tr>
<tr>
<td>Venture capitalists</td>
<td>Public Private Partnerships (PPP)</td>
</tr>
<tr>
<td>Micro insurance schemes</td>
<td>Public-private Community partnerships (PPcP)</td>
</tr>
<tr>
<td>Traditional credit and savings associations (so-called ROSCA, rotating credit and savings associations)</td>
<td>Full fledged privatization (or divestiture, like what happened in England and Wales to the water companies)</td>
</tr>
</tbody>
</table>

There are many different ways to involve the private sector (delivery mechanisms), but there are also different legal formulas possible: a special purpose vehicle (SPV), a joint venture (JV), using the Project finance formula (non-recourse lending), or some lease or concession contract. The challenge is to mix different formulas in an optimal way. Not mentioned were Export Credit Agencies (ECAs), which may help to obtain a certain technology at a
lower price. In recent years, the export credit agencies of OECD countries have collectively provided about US$ 70 billion annually of long term credit to developing countries (both public and private sectors) for purchasing goods and services in OECD countries. Probably less than 1% of this amount has been for water and renewable energy projects. A good example of a private sector involvement is the construction and operation of a waste water treatment (WWT) plant in The Hague in the Netherlands: Harnasch polder.
5
We are the private sector, a different definition

In the title of this valedictory address we have put the tension: SDGs are a global public good and since governments of poor countries do not have the money to achieve them, would the private sector be a solution. I proposed to use the broad concept of private sector, to include local private actors as well, from households to NGOs and CBOs and from small informal units to multinational corporations. The initiatives of the poor (their agency in sociological terms) are important and how this can be facilitated by government and NGOs, while at the same time regulating these activities to achieve minimum service standards for drinking water and sanitation.

The tables distinguished different private actors involved in financing, or in the actual construction and management, different financing instruments and different delivery modes. Besides there are also formal and informal actors and mechanisms. It is important to include in the private sector in developing countries local private actors as well. They range from households to NGOs and from small informal units to multinational corporations. I mentioned the increased attention for Small Scale Independent Providers (SSIPs) in the water sector, which are often informal sector operators.
Successful private sector intervention in the water sector, under which conditions?

The question to what extent will private finance play a role in achieving the MDGs and eventually the SDGs should be rephrased as under which conditions can private sector involvement in the water sector be expected to be successful, contributing to the achievement of the SDGs. The bottom line is that in these 12 years the debate on PSI has moved from “against privatisation” to “OK, but under which conditions”. Research has indicated the conditions under which PSI can be effective (achieving its goals; see Table 14).

The leading ideas of this valedictory speech were that there are many sources of finance and financial modalities, but it is important to create an appropriate economic environment or what is sometimes called an enabling environment allowing private initiatives to come forward, but regulate these operators at the same time! Subsequently all kinds of economic instruments can be used to achieve the goals formulated for integrated water resource management (IWRM) and different legal formulas can be chosen or delivery mechanisms used.

If money for investments of Operations and Maintenance (O&M) needs to be borrowed or if new investments are necessary, it is important to speak the language of the financial world. Bankers can be convinced if you show project results in a cash flow because users pay small fees and this flow allows reimbursement of the loan taken to finance project. The credit crisis may make it more difficult for developing countries to gain access to international credit markets for this type of projects, but on the other hand figure 2 showed a rebound recently.

What are the lessons learned from PSI in the water sector? One, promote flexible arrangement (management, service delivery, payment, etc) and different service levels for consumers. Secondly, calculate an appropriate and equitable tariff and billing structure. As part of the design and implementation process, establish and promote sources of local finance to help users pay for improved levels of service. The Willingness and ability to pay for infrastructure services should be assessed, not assumed. Finally, subsidies can be more effective if used to increase access to specific services: for example subsidising connection fees.

Research has indicated the conditions under which PSI can be effective (achieving its goals; see Table 14). There are major developments taking place in the sanitation sector and their
effectiveness can be enhanced through more government support and appropriate financing mechanisms (WSP, 2011). Initiatives at the household level and private finance can be an alternative for inefficient public schemes to provide sanitary facilities in the slums of African capitals, which rarely achieve cost recovery (WSSCC, 2011).

Table 16 Conditions for successful PSI in the water sector

<table>
<thead>
<tr>
<th>Condition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legal conditions in place</td>
<td>BOT law Gujarat (2002)</td>
</tr>
<tr>
<td>Regulatory framework available</td>
<td>OFWAT in the UK</td>
</tr>
<tr>
<td>Transparent tendering &amp; accountability</td>
<td>World Bank procedures are being used</td>
</tr>
<tr>
<td>Cost recovery system in place</td>
<td>Prepaid cards for drinking water in Uganda</td>
</tr>
<tr>
<td>Realistic tariffs, betterment tax or user fees</td>
<td>Water utilities in the Netherlands</td>
</tr>
<tr>
<td>Real competition (sufficient private operators), or quasi-competition (benchmarking)</td>
<td>In France a plethora of private operators, in England &amp; Wales (inset agreements), or the Netherlands (Harnaschpolder) &amp; benchmarking (Vewin)</td>
</tr>
</tbody>
</table>

The bottom line is that unbundling, technological progress (innovation) and competition should lead to more efficiency in the water sector as already argued in my inaugural address (Van Dijk, 2003), but is not enough! They could bring the price of water down like these forces did in the case of the telephone sector. Farquharson et al. (2011) summarize how to engage with PPP in emerging markets. A better basis to pay special attention to poor consumers can be derived from philosophy.
7

An example: saving Jakarta from sinking in the sea with the private sector

7.1 The NCICD project

We will now apply the lessons under which conditions PSI may be successful in the water sector and take the interesting case of building a dam for the coast of Jakarta, the capital of Indonesia, to solve the problem of Jakarta sinking in the sea without an intervention. Jakarta is in trouble. Parts of the city are sinking in the sea, while the sea level may rise due to climate change. As a result each year bigger parts of the city are flooded during the rainy season, as I experienced when I visited Jakarta in January of this year. Our technical colleagues have suggested that the solution would be one big dike, 2.5 km from the coast. Such a dike would solve the problem and provide space for new housing projects, for an industrial estate and a new ring road for Jakarta. It would create a big fresh water lake, which could supply the city with drinking water.

The proposed project is also about the polluted water of the 13 rivers which soon need to be pumped into the sea. The government would like the 50 billion dollar necessary to be provided fully by the private sector! The National Capital Integrated Coastal Development (NCICD) project tries to find a solution for this very serious problem of Jakarta, the problem of land subsidence, which at certain places in Jakarta north boils down to 7.5 centimetres decline of the soil per year.

I was asked to look at the possibility of private financing of the NCICD program, given the government does not want to finance the project. The NCICD project has a number of components and seems too big for one company to carry it out on its own. However, most of the components need to happen anyway, also without building new dikes (box 9). The Indonesian government has declared that it does not want to finance it, but would rather see the private sector picking up the bill.

I am convinced that partial private financing of the National Capital Integrated Coastal Development (NCID) program is possible if the project can be structured in such a way that different parts are interesting for private parties, if the right type of Public Private Partnership can be found and appropriate financing instruments and delivery mechanisms can be used.
Box 9  Financing urban infrastructure differently, ideas for the National Capital Integrated Coastal Development (NCICD)

My report contained eight messages and provided each time an international example to illustrate the message:
1. The need to split the project in components
2. Private sector finance possible for certain components
3. There are a number of financial instruments which can be used
4. The challenge is to mix different instruments and use different delivery mechanisms
5. The role of the government should be defined. It should be the owner of the project, do some preliminary investments and provide certain guarantees
6. Create the right governance structures to involve all the stakeholders
7. Are the conditions for an optimal functioning of the Public-Private Partnership (PPP) formula fulfilled?
8. Think already how we can generate revenues from these investments!

Source Van Dijk (2014).

Table 17  Components of the NCICD project, most of them need to happen any way

<table>
<thead>
<tr>
<th>According to the master plan</th>
<th>Corresponding components</th>
<th>Scope for private sector involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land subsidence control</td>
<td>Piped water supply</td>
<td>Concession of BOT</td>
</tr>
<tr>
<td></td>
<td>Stop extractions &amp; subsidence monitoring</td>
<td>Government regulation: do not allow pumping</td>
</tr>
<tr>
<td>Sanitation projects</td>
<td>Providing sewerage, treatment &amp; promoting connections to system</td>
<td>BOT a la Harnasch polder</td>
</tr>
<tr>
<td>Strengthen current sea wall &amp; river dykes</td>
<td>Current sea wall &amp; river dykes (A) &amp; Outer dike B / Outer dike C</td>
<td>One example of a small dike along the British coast where O&amp;M is done by a consortium</td>
</tr>
<tr>
<td>Ring road</td>
<td>Ring road</td>
<td>PPP project, DBFO</td>
</tr>
<tr>
<td>Enlarging the port</td>
<td>Enlarging the port</td>
<td>PPP project including bond issue</td>
</tr>
<tr>
<td>Space for industries</td>
<td>Industrial estate</td>
<td>PPP project using project finance and bond issue</td>
</tr>
<tr>
<td>Additional housing &amp; new sea front</td>
<td>Additional housing &amp; new sea front</td>
<td>Private project developers using project finance</td>
</tr>
<tr>
<td>Environmental impact assessment</td>
<td>Improve environment in river &amp; coastal area</td>
<td>Government task</td>
</tr>
</tbody>
</table>
The National Capital Integrated Coastal Development (NCICD) project has a number of components and seems too big for one company to carry it out on its own. The advantages of using different parties for different components is that there will be competition, this allows for more transparent procedures and such companies are easier to regulate. Instead of dealing with one big company if the individual companies fail their component it can be tendered again. It is important to determine which components would be interesting for PSI. I have tried to fill in the table based on my knowledge of similar experiences. What comes out is that the government will have to play a role, if only by providing guarantees for very risky investments.

7.2 Potential and complications

However, there were a few complications: the 13 rivers and canals flowing into the sea in Jakarta are heavily polluted because they serve as sewers and as places where people dump their solid waste. I was asked to come up with some suggestions to involve the private sector. “Prof. Van Dijk can you tell us how to do it, you seem so optimistic about this private sector”. I deal with this example of a big project, where the government would like the 50 billion dollar necessary to be provided fully by the private sector, because it illustrates very well under which conditions it will not work.

Can private finance be expected to develop the water and sanitation sector in Indonesia? The NCICD project in Indonesia is interesting. However, most of the components need to happen anyway, also without building new dikes (Table 15). Indonesia will have to become the owner of the project and just start with certain components.

However, the Indonesian government will also have to come with some money for initial investments and will have to provide certain guaranties. Under the current conditions it cannot be expected that the private sector will foot the whole bill. However, if the activities are cut up and put in the proper sequence, private partners will be interested, but the government will have to play a role as well. This case shows the complexity of PSI.
Conclusions

From the examples analysed some conclusions can be drawn. In the first place that often a combination of different economic and financial tools is necessary to analyze an issue and to come up with appropriate solutions. It is important that technicians have a feel which combination of economic tools to use to analyze an issue. The Switch project has generated useful experience with the use of some of the tools for water issues in the context of developing countries.

The lessons learned about the role and contributions of private water operators in the water sector show that we have to go toward more sustainable forms of PSI that can improve service quality and operational efficiency. There is a need for more realistic design and implementation plans. Direct private investment in water and sanitation has been less than expected and the financial contribution of the private sector has been mostly indirect, for example through people who have been buying the bonds issued for water related projects.

The bottom line is that in these 12 years the debate on PSI has moved from “against privatisation” to “OK, but under certain conditions”. Looking back it may be observed that the discussion on the role of the private sector in the water sector has gone through three stages:

- Polarisation and emphasis on efforts to privatize which failed: Cochabamba, Buenos Aires, etc.
- Confusion what divestiture means compared to PSI
- A better understanding of the complexity of PSI, trying to establish under which conditions it may be successful
Thanks

It may be clear that in an institute like UNESCO IHE an economist is a rare animal, there are only two employed and hence I have been happy to work for the Economic Faculty and since 2011 the International Institute of Social Studies (ISS) of Erasmus University and for a Business school (the Maastricht School of Management; MSM), where I found more like-minded people.

Multi- or inter-disciplinary research is often lauded, but I have come across very few real examples. However, I enjoyed working here, because basically there is an engineer’s mentality: we can make it! I enjoyed working with Maarten Blokland and Jan Willem Foppen in the discussed projects and with Stefan Uhlenbrook (PROACC). My (former) PhD students in earlier projects and for the next five years were always very stimulating and resulted in large number of joint publications.

Other colleagues I would like to mention at the end of the valedictory speech people with whom I enjoyed working in the Academic Board: prof. Piet Lens, Arthur Mynett, Dimitri Solomantine and Damir Brdjanovic. In my department prof. Pieter van der Zaag and Jetze Heun should be mentioned and in other departments Jan Luijendijk, Peter van der Steen and Nemanja Trifunovic. Of course the supporting staff should also be mentioned and in particular the Office of the rector and our secretaries Jos Bult and Selda Akbal. Ik heb gezegd!
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Notes

1. Van Dijk (2011a) deals with financing of and cost recovery in urban water and sanitation systems. A framework for integration of economics with technical sciences will be suggested linking the issues mentioned in the real water world to the tools of economics and finance. The research in the two slums in Kampala and in Dar es Salam was carried out by Etajak (2010) and Mwalwega (2010). See Van Dijk et al. (2014).

2. This Valedictory address will be preceded by an introductory keynote on ‘Sustainability without water?’ given by UNESCO-IHE’s Rector, Prof. Andras Szollosi-Nagy.


4. As a development economist you learn to analyze processes in developing countries and in particular how they affect poor people. My interest since my PhD in 1980 has been in the role of the urban informal sector (Le secteur informel de Dakar and Le secteur informel de Ouagadougou. Paris: L’Harmattan 1986).

5. The market would solve allocation problems better than a planning system (Ellman, 1989).

6. In behavioral economics (Thaler and Sunstein, 2008) many experiments are carried out.

7. An issue may be whose or what cost perspective do you take? The whole-of-society perspective (include cost to all relevant parties), or the perspective of the local government, the farmer, industrialist or household trying to use a water saving option?

8. The book provides (according to Wikepedia) ‘the ethical, philosophical, psychological, and methodological underpinnings to Smith’s later works, including The Wealth of Nations (1776)’.

9. Sedlacek (2011: 183) considers modern economics a typical product of the western civilization where material wellbeing is very important and ‘ethics has disappeared from mainstream economic thought’.

10. Mandeville (1770-1833) has turned the argument around when he concluded that the more vices there were, the more material well-being there could be.

11. There is a distinction between positive economics (dealing with what questions) and normative economics, dealing with what ought to be questions and which by definition then is value-laden.

12. This idea has been worked out in the hierarchy of needs theory van Maslov (Price and Vojinovic, eds., 2011: 235).

13. The official definition provided by Pieter Hennipman is effect outside the market but influencing societal welfare in a positive or negative manner (Fase, 2013: 220).

14. It should be noted that too many incentives, combined with greed and without strict regulation may lead to malpractices as we have seen during the financial crisis of 2007/8. The implication is that we have to fine-tune the incentives, control greed and put regulation in place.

15. This is the water foot print approach of our former colleague Hoekstra (2013), who seems to think that we would organize the economy differently if we take the water foot print into consideration. However, we will need prices to allocate goods and services and prices of water depend very much on the location, the use, the quality and the cost of cleaning and transporting. For that reason it makes absolutely sense to grow coffee in the hills of Ethiopia. As long as there is no infrastructure to collect the water and bring it to the dry parts of the country the farmers and the government benefit from this practice. It is quite likely that that the required infrastructure would not pay off, certainly not if the irrigating farmers in the valley are not paying the real price of irrigation water. The issue become more complicated if all the cost and all the benefits of this use would be incorporated (a social CBA).

16. Sometimes it is difficult to say what is a method (a way of doing things) and what is a tool (an instrument
helping to achieve the desired results).

17 We are preparing a special issue of the International Journal of Water on this topic.

18 The following reasons are often mentioned to involve the private sector: the Government has no money, is not efficient, has complementary expertise and complementary resources and the government cannot run these risks. PPPs are for complicated projects.

19 Multilateral Finance Institutions like World Bank (IDA, WB and IFC) and the Regional development banks. Although their loans cover only a minor part of current investment needs, they set the tone for others through their dialogues with government recipients and the understandings they bring.