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Technology Transfer through Water Partnerships

A Radical Framework of Assessment for Legitimacy

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The Global Governance Project is a joint research programme of eleven European research institutions. It seeks to advance understanding of the new actors, institutions and mechanisms of global governance, especially in the field of sustainable development.

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Abstract

Partnerships for sustainable development have become the official UN instruments to achieve the Millennium Development Goals. Among those working on water and sanitation, many focus on technology transfer projects. Transferred technologies are seen as tools not only to combat water scarcity or poor sanitary conditions, but also to alleviate poverty, ensure gender equality, improve health and environment. Yet, technological improvements cannot fulfill all these functions on their own. Thus, technologies that provide quick and easy access to water are not necessarily the most suitable ones for sustainable development of receiving communities. Indeed, a number of such projects fail at getting community support or ensuring their use of the water provided. In these cases, improvements in water access remain insubstantial, intentions of poverty alleviation are frustrated, and the technology ultimately faces rejection. To avoid such results, assessment of water partnerships and technologies should not be solely based on efficiency calculations but also take social implications into consideration.

To do this, we suggest a technology assessment framework based on the social critiques of Science and Technology Studies (STS) and Ivan Illich. While STS provides numerous conceptual tools to reconsider technology in general, Illich's concept of institutional spectrum is instrumental to examine the societal impact of particular technologies. Building on these two sources, our framework examines various contrasting characteristics that influence a technology's social acceptability and desirability, especially from the perspective of the receiving communities. Hence, this framework creates a scale to assess whether a technology preserves the autonomy, flexibility and self-reliance of a community or has predominantly manipulative and monopolistic tendencies that induce dependence. This framework is then applied to the technologies transferred by water partnerships registered with the UN Commission on Sustainable Development.

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Managing Series Editor

Foreword

This working paper was written as part of the Global Governance Project, a joint research programme of eleven European research institutions that seeks to advance understanding of the new actors, institutions and mechanisms of global governance. While we address the phenomenon of global governance in general, most research projects focus on global environmental change and governance for sustainable development. The Project is co-ordinated by the Institute for Environmental Studies (IVM) of the Vrije Universiteit Amsterdam and includes associate faculty members and research fellows from eleven European institutions: Science Po Bordeaux, Bremen University, Freie Universität Berlin (Environmental Policy Research Centre), The Fridtjof Nansen Institute Oslo, London School of Economics and Political Science, Oldenburg University, Potsdam Institute for Climate Impact Research, Vrije Universiteit Amsterdam, Vrije Universiteit Brussel (Institute for European Studies) and Wageningen University.

Analytically, we define global governance by three criteria, which also shape the research groups within the Project. First, we see global governance as characterised by the increasing participation of actors other than states, ranging from private actors such as multinational corporations and (networks of) scientists and environmentalists to public non-state actors such as intergovernmental organisations ('multiactor governance'). These new actors of global governance are the focus of our research group MANUS–Managers of Global Change.

Second, we see global governance as marked by new mechanisms of organisation such as public-private and private-private rule-making and implementation partnerships, alongside the traditional system of legal treaties negotiated by states. This is the focus of our research group MECGLO–New Mechanisms of Global Governance.

Third, we see global governance as characterised by different layers and clusters of rule-making and rule-implementation, both vertically between supranational, international, national and subnational layers of authority ('multilevel governance') and horizontally between different parallel rule-making systems. This stands at the centre of our research group MOSAIC–'Multiple Options, Solutions and Approaches: Institutional Interplay and Conflict'.

Comments on this working paper, as well as on the other activities of the Global Governance Project, are highly welcome. We believe that understanding global governance is only feasible through joint effort of colleagues from various backgrounds and from all regions of the world. We look forward to your response.

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Content

Introduction

> "In the imagination of the twentieth century, water lost both its power to communicate by touch its deep-seated purity and its mystical power to wash off blemish. It has become and industrial and technical detergent."
>
> Ivan Illich, *H2O and the Waters of Forgetfulness, p.75*

Since the early 1980s, multi-stakeholder partnerships have been promoted as a solution to problems of urban environmental management, such as waste management and water provision. Business partners would sign a binding contract with the governmental or municipal partners, thus ensuring their accountability. More recently, partnerships have become mechanisms of transnational and international governance, often with limited public authority overseeing their activities. They were promoted as 'Type II outcomes' of the 2002 Johannesburg World Summit on Sustainable Development, along with the traditional outcomes of the intergovernmental diplomatic process. Since then, public–private cooperation for sustainable development has been institutionalised in this loosely defined concept, rendering it a legitimate mechanism of global environmental governance. Their legitimacy and effectiveness have been debated extensively in the discipline of International relations (IR), often focusing on problem-solving. It is necessary to complement these considerations with studies focusing on the content and rationale of partnership projects, whereby the changes initiated in the recipient communities can be identified as legitimate and desirable as opposed to interventionist, and impoverishing. From this point of view, technology transfer lies at the heart of several questions regarding the legitimacy of new governance arrangements.

In the run-up to the Johannesburg Summit, water was declared one of the five major issue areas (the WEHAB[1]) "in which progress is possible with the resources and technologies at our disposal today" as Secretary-General Kofi Annan would put it (Rai, 2002). "To halve, by 2015, the proportion of the population without sustainable access to safe drinking-water and sanitation" is also one of the environmental targets of the Millennium Development Goals (MDGs). Considering this focus on water related issues, it is clear why partnerships working in this field make up the greatest fraction of partnerships for sustainable development, registered by the United Nations Commission on Sustainable Development (UN CSD) covering a range of issues such as provision of drinking water, sanitation, urban infrastructure, irrigation capacity farming, and purification of polluted water. These partnerships introduce various

[1] Water, Energy, Health, Agriculture, Biodiversity

technologies to the countries of implementation (CoIs) by technology transfer. Some of these technologies are built on the existing 'indigenous' techniques and aim at increasing their efficiency, whereas others are cutting edge techno-practices that claim to be more efficient in the exploration, extraction, distribution, irrigation, or cleaning of water.
As the framework established by the UN documents has underscored the urgency of the water problems, the extent to which these technologies could be swiftly and widely implemented has been an important part of the (self-)assessment criteria. For instance, one partnership claims that before it existed the people "have organized themselves into so called 'water committees', building their own water systems in an uncoordinated, inefficient way (they lack technical skills and experience) [while with the partnership it would be possible to] build water systems [such that] each water distribution system will gather between 100 and 500 household connections (homes)" (Agua Para Todos, 2008). The preference in such cases appears to be on efficiency and the urgency of drinking water problems emphasized in the UN context, rather than the self-organising skills and choices of communities, a preference that may at times undermine the long-term sustainability of the partnership's technology. The aim of this paper is to examine this dilemma, and study how the complete package transferred by water partnerships (i.e. both the technological artefacts *and* the accompanying social measures), influence the legitimacy of these technologies and the transfer process.

Water Governance under the United Nations: Linking Water Issues to Poverty

Water scarcity has been causally linked to poverty in the United Nations (UN) sustainable development frameworks since the Rio Earth Summit, 1992. Agenda 21 devotes its Chapter 18 to the protection of the quality and supply of freshwater resources, suggesting that the application of integrated management approaches to water would not only protect this critical 'resource', but also alleviate poverty. To this end, the report suggests, "innovative technologies, including the improvement of indigenous technologies, are needed," but it does not further specify what kind of technologies are in line with its conceptualisation of sustainability. This ambiguity raises several questions, such as whether innovation as such is identical to sustainability, whether indigenous techniques actually need to be improved by modern innovations, and of course, whether all these 'improvements' can alleviate poverty on their own, and otherwise in combination with which other practices.

Agenda 21 drew several parallels between water management and poverty alleviation, highlighting the vitality of safe water supplies for environmental protection and poverty alleviation in both urban and rural environments. In the so-called 'developing' countries, "soil erosion, mismanagement and overexploitation of natural resources and acute competition for water" were listed as the main reasons for poverty, hunger, and famine. This understanding was reified in the reports of UN institutions in the following years. For instance, a report by the World Health Organisation (WHO) and the United Nations Children's Fund (UNICEF) listed the effects of water problems as follows: "The combination of safe drinking water and hygienic sanitation facilities is a precondition for health and for success in the fight against poverty, hunger, child deaths and gender inequality" (WHO/UNICEF, 2004: 2). In the context of the CSD, these linkages have been reinforced, as is reflected in the statement that "in developing countries water is crucial for sustainable development and poverty alleviation" (CSD, 2006: 5). The assumption underlying all these statements appears to be that 'improved water governance would reduce problems ranging from water conflicts, to poverty, hunger, famine, health issues, gender inequality and improve (both) environmental conservation and economic development.'

Six years after the MDGs were set, *The 2nd UN World Water Development Report* argued that the problems regarding water have reached a point of crisis, and this was "largely a crisis of governance" (UN, 2006). The same report made two important points: firstly, there was little improvement in water related services in sub-Saharan Africa and least developed countries of Asia since 2002 (ibid: 53). Secondly, "many water multinationals, as well as governments, so far have not been able to provide the type of technology that developing countries need" to meet the target set by MDGs (ibid: 72). In other words, the particular technologies required by the localities in question were not supplied; hence there was a huge demand for small-scale improvements. The report noted that the aid allocated to low-cost and small-scale technologies was increasing, and this should be further promoted together with *integrated water management approaches*.

In terms of overseas development assistance (ODA), allocations for water and sanitation have been relatively static at about 15 per cent and 8 per cent of the total aid respectively; assessments of water and sanitation plans suggested that aid flows were insufficient to reach the MDG targets (UN 2008: 10). More importantly, the share of aid for the water sector as a percentage of all sector-allocable ODA was falling sharply from the 2000-level (ibid: 11). Although many water projects were in place, the success of these governance arrangements was not evenly distributed within and among countries (Martens and Deibel, 2008: 4-5).

Legitimacy of CSD Water Partnerships & Technologies Transferred

The literature review above reveals that from the perspective of the MDGs and the UN, water governance has largely failed to reach its targets. The failure of water governance from the UN perspective however does not imply that partnerships as a mechanism of global water governance are an inevitable failure. Partnerships are neither directly nor solely the responsible institutions for this failure, nor can it be assumed that water governance has been a failure for all stakeholders.[2] The complex web of governance would not allow for such a

[2] Indeed, while some water partnerships may have met their individual goals, it is the UN definition of water problems that was not solved.

simple causal relationship. Moreover, partnerships were intended as implementation mechanisms, and the legitimacy of the *partnership regime* as a whole was based on its potential to alleviate the implementation deficit.

Regardless of their potential effectiveness, however, so far CSD partnerships have been unable to reach the MDG target on water. Conversely, they are nonetheless perceived to be more successful than partnerships on the other WEHAB areas. According to the Global Sustainability Partnerships Database (GSPD), more water partnerships (68.8%) generate output than partnerships on other issue areas (62.1%). They are also more transparent: 83.3% have a website on their activities and 37.5% have monitoring mechanisms, while for the rest of the sample these ratios are 75.9% and 22% respectively. In a series of expert interviews, respondents consistently evaluated water partnerships as more successful than others in some key issues: on average water partnerships have been assessed more positively than others on filling the implementation and regulation deficits, in their ability to create new financial resources, being innovative and addressing urgent issues (Table 1).

Table 1- Comparison of expert evaluations on partnerships on water versus other issues
(Source: GSP Database)

Expert Evaluation (Scale=1-5)	**Water Ps**		**Other Ps**	
	Mean	Std. Dev.	Mean	Std. Dev.
filling implementation deficit	3,70	0,83	3,36	0,98
filling regulation deficit	3,96	0,65	3,57	0,85
creating new financial resources	3,70	0,81	3,18	0,96
creating innovative solutions	3,66	0,69	3,51	0,88
focusing on an urgent issue	4,22	0,70	3,80	0,89
filling participation deficit	3,53	1,10	3,27	0,95

In sum, water partnerships are more successful than others while water governance in general is failing -even according to the UN sources. One reason for this differentiation may be that the MDG targets focus on drinking water and sanitation access, while the CSD water partnerships focus on a far more diverse set of issues. Thus, they do not all contribute to the effort in addressing the MDG water targets, instead some of the perceived success may be related to those partnerships working on other issues, such as water pollution, hydropower, and irrigation. Furthermore, the discrepancy between achieving the MDG target and the success of water partnerships may be related to the global economic and political context in which water partnerships operate: Since the 1990s, this background is characterised by commodification of drinking water and privatisation of water and sanitation services in both the North (e.g. Germany and UK) and the South (e.g. Bolivia). In this context, water partnerships have been invoked mostly as privatisation mechanisms (Finger & Allouche, 2002; Hall & Lobina, 2002; McDonald & Ruiters, 2005). Thus, to some extent, the perceived success of partnerships may be related to the fact that they are seen as being consistent with the current neoliberal order. Conversely, private sector involvement in the water sector has been met with varying degrees of social acceptance, as it raises concerns regarding the affordability, accountability and equity of water provision (Hall & Lobina, 2006).

While equity-related problems are an important dimension of legitimacy in water governance, there is no direct causal relationship between public and/or private involvement and social acceptability. Among CSD water partnerships, this observation is supported by type of actors that initiated the partnership: An overwhelming majority of lead partners are intergovernmental organisations and state actors, and not corporations or for profit organisations (Figure 1). When we examine the actor constellation of water partnerships, too, we find that state partners, non-governmental and intergovernmental organisations are the most frequent partners (Figure 2). Therefore, it would be difficult to suggest that CSD water partnerships overall are a means to further commodification, or a privatisation mechanism for corporations. Indeed, while some of the existing literature suggests that water partnerships are a privatization mechanism, they are also often seen as reflecting a 'leftist', participatory vision (Bakker, 2008), or even a merger of these two perspectives.

Figure 1 – Sectoral Distribution of Lead Partners in Water and Other Partnerships
(Source: CSD Database)

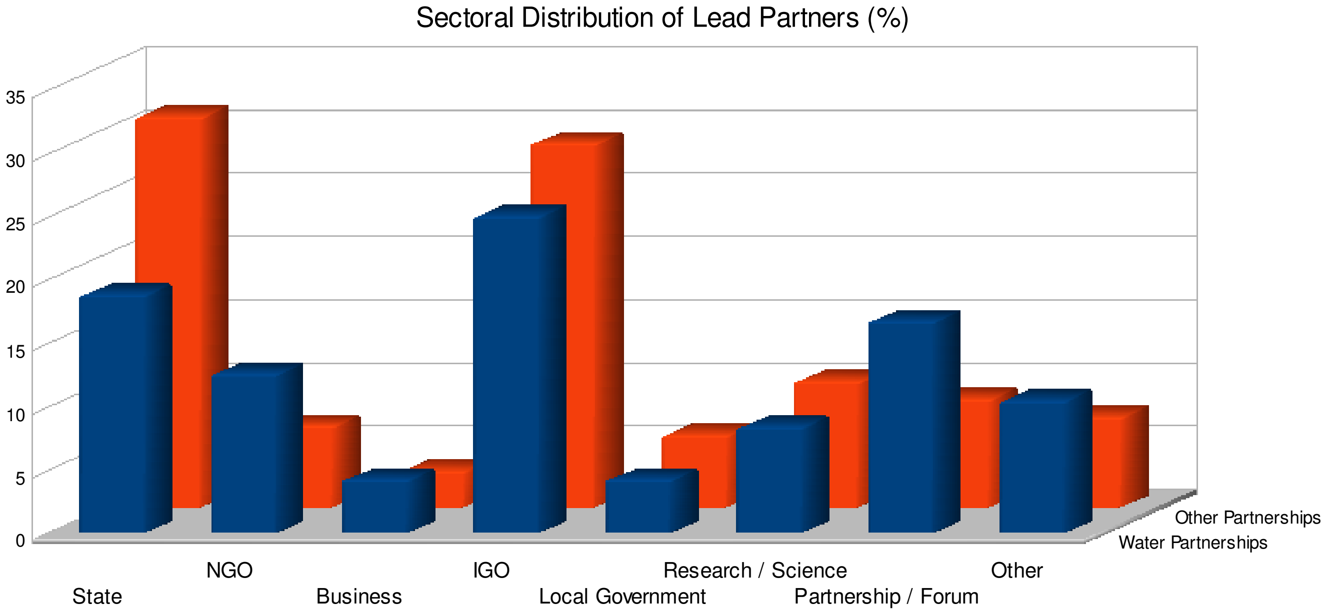
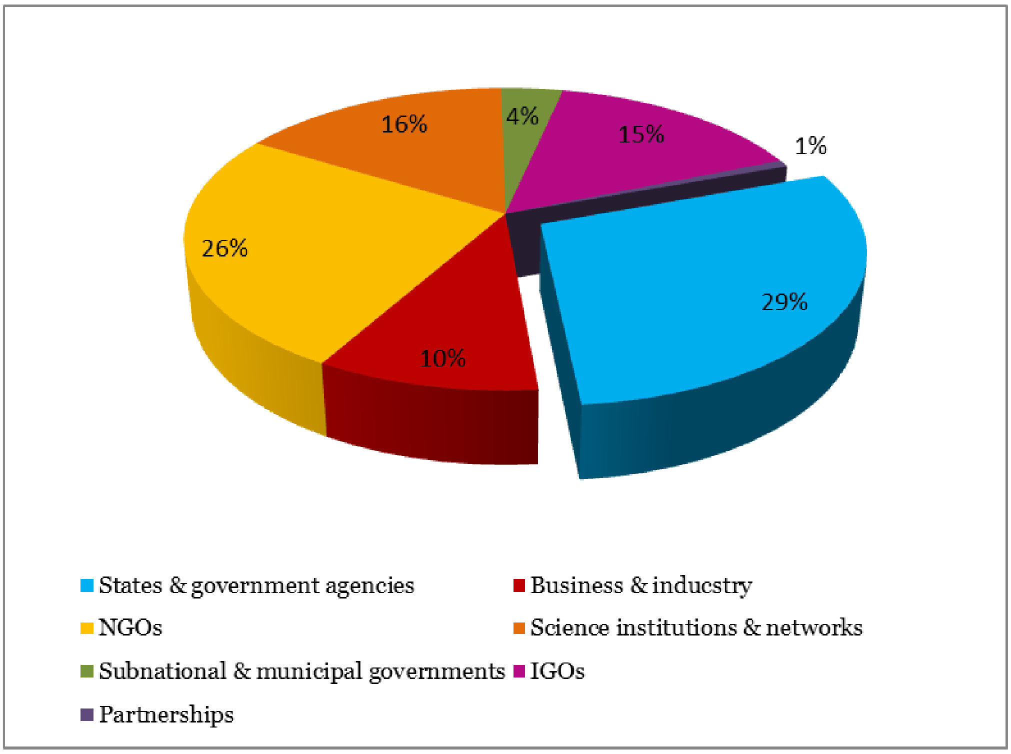


Figure 2 – Sectoral Distribution of All Partners in Water Partnerships (Source: GSPD)



In summary, although the UN in general regarded water governance as a failure, the CSD water partnerships are not directly associated with this failure. On the contrary, especially in comparison with other partnerships, they were evaluated rather positively. The water partnerships under the CSD do not appear to be heavily dominated by corporations, and are not regarded as privatisation mechanisms. Overall, CSD water partnerships are not suffering from the same legitimacy crisis that the UN water governance in general is. Hence, they provide a useful sample to study the legitimacy of the technology transfer process.

Another reason why water partnerships may not be perceived as a failure is that they are more often geared towards transfer and implementation of technology than others (Table 2). The basic assumption of this paper is that it is not only the efficiency but also other characteristics of technologies and the technology transfer process, which determine their social acceptability and legitimacy in the long run. The choice of technology and the way it is implemented may have implications on equity in access, self-reliance in water collection, storage and maintenance (as opposed to paid external services), the extent of environmental impact, and whether the affected people are viewed as individual customers or as communities. In order to write an account of these aspects, we will not focus our attention on the consequences of each water partnership (this would be difficult as several partnership projects are not yet complete), nor will we study their overall affect on water governance and institutions.. Our focus will be the *potential implications* of the technology transfer, the features and the logical end results of the technology implementation for the societies they are transferred to. As indicated by Moriarty et al. (2004: 35) "Technology choice sits at the heart of a complex network linking needs, water and financial resources, skills and support structures", at the same time the partnerships also maintain some flexibility during the technology transfer, to the extent that two very similar technologies have on occasion been implemented with very different outcomes. We suggest that an analysis of such interlinkages must focus not only on the implications of any given technology choice in terms of infrastructure costs, maintenance needs, operational models but also 'what the technology choice brings to the communities' in terms of autonomy, reversibility, flexibility, inclusiveness, changing patterns of social behaviour, and the extent to which communities maintain their freedom to self-organise in the future.

Table 2- Technology transfer and technical implementation ratios of water and other partnerships

	Technical / Technological function		Other functions		Total
	Frequency	%	Frequency	%	
Water Partnerships	17	35,4%	31	64,6%	48
Other Partnerships	77	27,3%	205	72,7%	282
Total	94	28,5%	236	71,5%	330

Technology

Apart from the effectiveness narrative that justifies the partnerships regime in general, the way partnerships as governance mechanisms operate is justified by an assumption of democratic legitimacy, presumably achieved through the participation of stakeholders from different sectors and geographies (Mert, 2009; Bäckstrand, 2006). In other words, the participatory ideal of the UN's development discourses also underlies partnerships: Since Agenda 21, partnerships have been understood as a way to include different stakeholders into the sustainable development project. However, participation is not so clear-cut a matter on the ground: The participatory principle is operative in partnerships only to a very limited extent. As long as there is a local partner from the CoI, the partnership and its activities appear sufficiently democratic. However, this is not sufficient to ensure the *general* social acceptability of the technologies transferred. For example, any partner from the CoI can be regarded as a 'developing country stakeholder,' even if this partner has no connection to the communities in question. Moreover, in some partnerships there are less local partners than there are countries of implementation; hence a local partner in Angola presumably represents all developing countries or communities across the world. The problems regarding the representation and participation are beyond the scope of this paper. [3] It should be noted that the CSD framework does not imply a legitimate participation process, and in its extreme form it assumes a false singularity of opinion among all stakeholders in a community, all communities in a CoI, or across CoIs. Furthermore, the participation of any 'developing country stakeholder' in the partnership cannot be equated with a technology transfer process that is participatory. Transnational development aid in the form of technology transfer requires us to have a different approach.

The UN governance platforms assert that more innovation is causally linked to better water management and to poverty alleviation, while simultaneously emphasising participation. Nevertheless they do not specify what is meant by participatory approaches in innovation, or the causality between poverty and these other factors. The assumption underlying these ambiguities appears to correspond to the critiques in the literatures of sociology, science and technology studies (STS), and critical theory, which aim to show that the structure of technology is not the main cause of social change. These critiques are based on a rejection of 'technological determinism' (that the uses of technology are largely determined by the structure of the technology itself, and that technological advances are the main cause of social change). They suggest that technological innovation is influenced by its political, social and cultural context. The same is true for studies that critically engage with legitimacy of technological innovations. There are many examples in literature where the legitimacy of new technologies in one way or the other relies on a democratic legitimacy model (e.g. democratic rationalization work of Feenberg 2004: 210-212; democratic politics of technology as suggested by Sclove 1995).

There are three problems regarding the application of these models on technology *transfer*.

Firstly, these models assume that the more participatory *the innovation* or *selection processes* are, the more legitimate the resulting technology or product is. However, technology *transfer* operates differently: once the innovation process is completed and the resulting technology and/or products are installed elsewhere, it is only possible to appropriate the technology to a very limited extent, not to re-design it from scratch. While studying the legitimacy of technologies introduced by water partnerships, this assumption must be juxtaposed with the democratic deficit in transnational governance (i.e. in the formation of partnerships): Partnerships are vehicles through which a certain technological innovation is brought into societies that is neither produced by them, nor necessarily chosen by a majority of their population. As we noted, any local partner can act as the vehicle of official justification and legitimation for the new technology to be introduced. As we have also noted these projects are often initiated by IGOs. In this sense, many partnerships (particularly large-scale and high-tech projects) have a top-down approach: Only a certain proportion or sector of the local communities, e.g. local companies, universities,

[3] Beisheim, et al. (2009: 6), for instance, observe that stakeholder involvement is more pronounced at the country level than it is at the transnational level, which includes "countries" as partners. See Schäferhoff et al. (2009) for the limitations of stakeholder involvement in general, and from developing countries in particular. Also see Campe (2008) for the specific details of stakeholder involvement in CSD water partnerships by case studies.

chemical or agricultural producers are involved so as to receive trainings and benefit from the technology. Such top-down installation of a technology does not easily fit the participatory and democratic picture painted by partnership projects.

Secondly, while these models are based on a rejection of 'technological determinism', transnational technology transfer as such assumes that technological development determines social change. The interlinkages highlighted in the UN documents are manifestations of this: Transfer of technology is assumed to be able to solve all kinds of issues ranging from poverty to gender inequality. Our belief is that, at best, slightly more participatory technology transfer by way of water partnerships would negate the political nature of social change. It is therefore important to be cautious and specify in detail which aspects of technological change would potentially bring about what kind of social changes. Thirdly, these models are difficult to universalise in the context of technology transfer, particularly when the democratic context and background of the countries of implementation, or the accountability and participation of the transfer process cannot be guaranteed.

Technologies are products of political and cultural negotiations of a certain context; when introduced into an alien one they are more difficult to re-negotiate. This is in line with two concepts (1984) defined by Bijker and Pinch in their seminal article "The Social Construction of Facts and Artefacts": *flexibility* and *closure*. While *interpretative flexibility* refers to the different interpretations of a technological artefact among different stakeholders, *design flexibility* refers to the multiple ways of constructing technologies (reflecting the various interpretations of stakeholders). In time, flexibility diminishes as *closure* takes place. This can be, for instance, a rhetorical closure: When the problem is perceived as solved, the demands for alternative designs disappear; or the artefact in the focus of conflicts can be stabilised through the redefinition of the problem, or by prioritising another problem it actually manages to solve. Closure is not a permanent state: new social demands can always cause a new round of debate or conflict about a technology, reintroducing interpretative flexibility.

When a technology is transferred, the receiving society, too, has choices: it can accept, reject, or appropriate it. It is however almost impossible to return to the design stage, for structural and psychological reasons: the new technology is often either presented as superior or as the only immediate and present solution for the problem. Otherwise it might replace or disable the existing indigenous technologies. This does not mean that the interpretative flexibility completely disappears. However, in the development of a new technology interpretive flexibility would generate different *problems related to the new technological artefact* to be solved, different aspects or functions to be prioritised in the further development of the technology, before the artefact is stabilised. This does not happen in cases of technology transfer, as the rhetorical closure has already taken place and the design is already stabilised. The black-box of technology remains closed despite problems, often simply because the infrastructure for re-design does not exist. However, the design of the technology and the extent of appropriation is not the only issue that will be examined here – similar technologies are often transferred with differing accompanying 'packages', addressing issues such as education programs, pricing, job creation etc. These things may also have implications for the way infrastructure is implemented, even if design closure has already taken place.

In other words, the water technologies introduced by partnerships might have effects on the receiving societies, as they cannot be negotiated extensively by all users or affected parties. The difficulty of re-design and re-negotiation turns the problem-solving and appropriation process (an extensive process of many adaptations, versions, negotiations, consultations etc.) into a success or failure factor for the technology, the partnership, or even at times for the society in question.[4] So, a new framework that could assess the technologies in question in terms of their desirability, equitability, and plasticity, can better address the legitimacy question. In search of principles that would attend to the listed problems, we turned to the work of Ivan Illich, who suggested that the litmus test for the legitimacy of a technology would be its transfer to a so-called 'developing' country. Illich's writings on the perceptions of water (Illich, 1985), technology and institutions (1971, 1974, 1975), as well as development and ecology (1973, 1974, 1978) have been influential on critical thinkers of technology, ecology, and development. But most importantly, his critique of institutionalisation allows us to scrutinise the aforementioned specificities of technology transfer undertaken by water partnerships.

Framework of Assessment for Legitimacy of Technologies

In his *institutional spectrum,* Ivan Illich (Illich, 1970 [2002]: 52-64) studies different types of institutions extensively. Institutions on the left side of the spectrum are enabling: they support users without intervening in established habits and lifestyles. Conversely, on the right extreme of the spectrum are institutions that are constraining and manipulative, for example by creating new needs that previously did not exist.

These institutions include technologies and infrastructures as well. In particular, one idea that is central to Illich's thinking is that many institutions and technologies reach a threshold, where they progress from supporting self-help and reuse, to negating their original usefulness. One example is transportation infrastructure (Illich, 1972: 141-2), which Illich presents as having undergone two watersheds. At the first watershed, automobiles and improved roads facilitated mobility. However, at the second watershed, the magnifying scale and scope of the technology leads to counterproductive results: in the case of transportation, the increasing focus on speed meant that smoother, expanded highways swallowed ever-increasing sums of tax money. Furthermore, the modern highway infrastructure began to dominate lifestyles,

[4] Throughout our research, policy makers asked us about the "the areas in which partnerships are least effective." From a governance deficits point of view, building partnerships elsewhere on the basis of such information would further broaden the implementation deficits in areas with "most need". See Biermann et al. 2007, for the geographical imbalances of partnership projects.

for example a farmer can no longer travel to the marketplace to buy or sell goods without taking a bus or putting the produce on a truck.

A new technology enters into an individual's life often through advertisement of a certain product or artefact: this necessarily includes the suggestion that there is a lack, a need to be filled (Žižek, 2001). On the other hand, the institutionalisation of each technology discourages competitors. The same is true for communities receiving a new technology: Technology transfer comes together with advertisement campaigns, CSR and PR conducts, as well as trainings for users/supervisors and infrastructural investment that creates a certain level of path-dependency. The possibility for an autonomous citizenry to employ a certain technology and appropriate it (even partially) depends on the nature of the technology itself: Such autonomous appropriation is possible on condition that the technology does not (1) manipulate the wishes of its users through creating a new set of needs (what he terms the creation of *false public utilities*), and (2) disable autonomous action against the cause of the perceived problem or obstruct subsistent or autonomous production of alternative solutions (the formation of *radical monopolies*). Otherwise, the appropriation of the technology by the community in question is impossible, because the technology "subvert[s] the very purposes for which [it] had been engineered and financed originally, [resulting in] paradoxical *counterproductivity* –the systematic disabling of citizenry. A city built around wheels becomes inappropriate for feet" (Illich, 1970 [2002]: 28).

Counterproductivity is caused by the institutionalisation of technologies and economic models based on *heteronomous* production that ignore use-values. These can be called *manipulative technologies*, as their ignorance of use-values lead to commodification and manipulation of the citizenry through the creation of newly designed needs (ibid: 29-32; also see Illich, 1992). This understanding of use-value relates to Marx's (1867 [1999], Chapter 1) conceptualisation of the term:

i) when the utility of a thing is not due to labour, that thing can possess use-value without having value (e.g. air, soil, etc);

ii) when labour is involved to directly satisfy desires and needs of the labourer, the product can be useful without being a commodity;

iii) a commodity is only produced when the labourer not only produces use-values, but also *social* use-values (i.e. use-values for others)

iv) lastly, only objects which are useful have value, irrespective of the time and labour dedicated to its production.

For Marx, someone who uses her own labour to satisfy her own needs is not producing a commodity, but only use-value. Illich (1970 [2002]: 31-33) focuses on *the ability* to satisfy one's own needs as the critical factor separating *heteronomous* production based on commodification and *autonomous* production based on use-values: the latter has a quality of self-affirmation that professional production cannot satisfy. These two distinct production models can co-exist only to a limited extent, because

> "There are boundaries beyond which commodities cannot be multiplied without disabling their consumer for this self-affirmation in action. [...] Only up to a point can heteronomous production of commodities enhance and complement the autonomous production of the corresponding personal purpose. Beyond this point, the synergy between the two modes of production, i.e. self-guided and other-directed, paradoxically turns against the purpose for which both use-value and commodity were intended."

This boundary is a result of the fact that commodities cannot completely replace use-values. From the viewpoint of the thing, which is the concern for Marx, a thing (or the labour involved in that thing) has no value unless it is an object of utility.[5] From the viewpoint of the individual, which is the concern for Illich, there is a certain value in the process of putting her labour into a product: "Needs that are *satisfied rather than merely fed* must be determined to a significant degree by the pleasure that is derived from personal autonomous action" (ibid: 31, my emphasis). Beyond a certain point, commodities only serve the interests of the professional producer, while the consumer's satisfaction is limited by her non-involvement, the disabling of her pleasure derived from autonomous production. Similarly for communities, Illich recognises the disabling potential of technologies that are suggested, transferred, implemented, produced and often maintained externally, by professional producers. When the community itself does not solve its unique problems, through its unique culture, its satisfaction is curbed.[6]

Another factor that limits *heteronomous* production is the environmental impact of ("every form of") mass production, including the mass production of services. But even if the environmental effect of the technology is minimal, its mass production would disable autonomous production (ibid):

> "Medicine makes cultures unhealthy; education tends to obscure the environment; vehicles wedge highways between the points they ought to bridge. Each of these institutions, beyond a critical point of its growth, thus exercises a radical monopoly. [...] A radical monopoly goes further [than a commercial monopoly]: it deprives the environment of those features that people need in a specific area to subsist outside the market-economy. [It] paralyzes autonomous action in favour of professional deliveries. [...] This radical monopoly would accompany high-speed traffic even if motors were powered by sunshine and vehicles spun of air. [...] At some point in every domain, the amount of goods delivered so degrade the environment for action that the synergy between use-values and commodities turns negative. Paradoxical counterproductivity sets in."

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[5] For an outstanding critique of Marx's use of the term, see Hannah Arendt's *Human Condition* (1958 [1998]: 165-166). Arendt here notes that the older word, *worth* is replaced with "the seemingly more scientific term *use-value*", which Marx also took over. Yet, Marx did not summon up the intrinsic worth of the thing, and instead by putting the function things have in the consuming life process of men, he ignores both objective/intrinsic worth and subjective/socially-determined value.

[6] This is also a starting point of Illich's critique of development, and he surely would disagree with technology transfer as development aid. This makes his theory most appropriate to assess the legitimacy of technology transfer if one is to disregard the dominant urgency/efficiency discourses.

Illich regards certain technologies (e.g. transportation by cars in highways, large-scale energy production, modern medical technologies) and institutions as the most extreme examples of *manipulative* institutions. Others, such as pavements, telephone lines, bicycles, small scale and/or subsistence level markets and industries are *convivial* ones. Most technologies and institutions lie between these extremes. Moreover, as institutionalisation of a concept, product, artefact or technology continues, it can move from left to right, from facilitating activity to organizing production. To highlight that technologies and institutions lie in a continuum and are mobile through time, Illich calls this an 'institutional spectrum.' The characteristics of the institutions that are at the right and left extremes of the institutional spectrum can be listed as follows.

Manipulative institutions are characterised by:

1. **Manipulation of clients**
   - The service is imposed; the client is subject to advertising, aggression, indoctrination, medication, imprisonment, electroshock etc.
   - The product results from highly-complex and costly production processes, which include expenses concerned with convincing consumers of their need of the product.
2. **Counterproductivity**
   - They tend to develop effects contrary to their initial aims, as the scope of their operations increases.
   - Many assume a therapeutic and compassionate image to mask this paradoxical effect.
3. **Coercion**
   - The rules that govern them call for unwilling consumption or participation.
   - Membership is achieved in two ways: by forced commitment or by selective service.
4. **Being either socially or psychologically "addictive"**
   - Social addiction means the tendency to prescribe increased treatment if smaller quantities do not yield the desired results.
   - Psychological addiction is clients' continuous need for more of the product.
5. **Inviting compulsively repetitive use**
6. **Creating *radical monopolies***
   - Systematically frustrating alternative ways of achieving similar results.
7. **Creating a demand for *false public utilities***
   - Manipulating public taste such that a particular need is articulated into a demand that requires public services (which in turn boost their use).

Convivial institutions are characterised by:

1. **Spontaneous use**
   - They do not require advertisements to induce their clients to use them.
   - They exist to be used rather than to produce something.
2. **Being self-limiting**
   - The rules that govern them set limits to their use, with the purpose of avoiding abuses which would frustrate their general accessibility.
3. **Amplifying opportunity**
   - The service they provide is amplified opportunity within formally defined limits.
4. **The client remains a free agent**
   - They tend to be networks, which facilitate client-initiated communication or cooperation.
   - They are often self-activated institutions.
5. **Serving a purpose beyond their own repeated use**
   - They do not identify satisfaction with the mere act of consumption.

Our assessment framework based on Illich's critique of technology and his institutional spectrum can be seen in Table 3. This framework translates these core concepts into an assessment scale, which is used in the next section to analyse different technologies transferred by water partnerships. Our underlying assumption is that, if a technology creates dependency of the communities on the investor/initiator, or increases the existing inequalities, or disables other ways of organising for equitable water sharing or distribution, or frustrates indigenous technologies, its legitimacy is questionable. In other words, the legitimacy of technology transfer projects depends upon whether the project creates false public utilities, radical monopolies, and results in counterproductivity. If so, regardless of their effectiveness or environmental friendliness, their transfer should be regarded illegitimate.

Accordingly, our assessment scale is based on a convivial-manipulative coordinate. On the left hand side of the table, the features of the convivial/autonomous institutions and technologies are listed, while on the right hand side we list that of the manipulative/heteronomous ones. In each box, there is a defining feature of such institutions (in bold script), followed by a list of indicators that might on their own, or in combination help us determine the extent to which manipulation, commodification, dependency, monopoly and coercion (or the convivial opposites) take place through the transfer of a certain technology. Some of these features are interrelated, and in the first instance appear repetitive, but as our assessment is not quantitative, we do not regard such overlaps as problematic.

Table 3 - Framework for Assessing Manipulative and Convivial Technologies

Left (Convivial / Autonomous Technologies)	Right (Manipulative / Heteronomous Technologies)
1. Allows spontaneous use: a. Technology exists not as a service or a commercial product, but an opportunity to facilitate water access. b. Water provision and maintenance is without financial constraints. c. Initial infrastructure costs are low. d. Advertising is not involved as users need not be convinced of the value.	**1. Is manipulative:** a. Water provision involves complex and/or costly processes, the financial costs of which are passed on to the users. b. The technology and its maintenance are expensive. c. Advertisements stimulate demand, suggesting the service is necessary or irreplaceable.
2. Is self-limiting: a. The inherent characteristics of the technology limit its *commercial* viability. b. The technology limits overconsumption of water	**2. Is counter-productive:** a. The technology has side effects that may contradict the original intentions. b. It is inserted, in the form of aid, assuming a compassionate image to mask its counterproductivity.
3. Leaves the client a free agent: a. Users have a right to the service, extent of usage is not defined by level payment. b. Users and communities are involved in decisions regarding implementation and maintenance of the technology. c. Users are essentially self-reliant, and responsible for use and repair of the technology.	**3. Is coercive / exclusive or creates dependence:** a. Users must pay for the service, or face exclusion. b. Users have limited or no input in the design, implementation and maintenance of the technology. c. Maintenance of the new technology cannot be provided by the community itself and requires professionals.
4. Serves a purpose beyond its repeated use: a. The aim of the service provider is not to expand the technology to other areas for the sake of market access. b. Communities retain other ways of accessing water.	**4. Has monopolistic tendencies:** a. The aim of the service providers is to expand the technology to other areas in search of new markets. b. Customers have no option but to obtain the water-related service or product from one provider.
	5. Creates false public utilities: a. The technology is propagated as a solution for the entire public, but is in reality only accessible to a certain (e.g. non-poor, non-rural) group. Public taste is manipulated in favour of this solution.

Assessing Legitimacy of Water Technologies

The CSD Partnerships also employ the UN discourse on water, highlighting the interlinkages between water-related problems and all other social, environmental and developmental problems. Some of them focus on providing water for the poor or those living in isolated areas (e.g. WSUP – Water and Sanitation for the Urban Poor, PROASNE – Northeastern Brazil Groundwater Initiative, Agua Para Todos). In many cases, the link between water access, development and poverty reduction is explicitly mentioned. For example, the Global Rain Water Harvesting Collective relates its water access improvement aims not only to providing drinking water for the poor and isolated, but to enabling children to attend school instead of collecting water, to make communities less dependent, reduce water-borne diseases and with all this contribute to poverty alleviation. The Rainwater Partnership (2008) states that "rainwater harvesting has proved to be an excellent, low cost and simple technique in combating water related poverty in developing and developed countries" due to the access it provides to cost-free water. Similarly, the Desert Rainwater Harvesting Initiative (2009) states that it "is a grassroots project aimed at alleviating poverty by providing a reliable water supply to [remote populations]."

This apparent consensus that water access in general would have positive implications for poverty levels, equity between and within communities, and environmental sustainability, inherently affects the self-reporting of the partnerships we study. As we depend on these self-descriptions and reporting in our analysis, our goal is to distance ourselves from this assumption. The use of the assessment framework provided above would allow for a less partial study of the technologies in question, as it does not assume a relationship between access to water and reduced levels of poverty, inequality, and environmental degradation. When evaluating projects and technologies, the self-reportedly positive statements are thus naturalised to a large extent. Secondly, it focuses on the technologies rather than the other features of the partnerships, therefore offering a more pertinent analysis.

1. Airborne geophysical exploration

PROASNE is a partnership aiming to develop a more dependable water supply in northeast Brazil during drought. For one of its numerous projects, it maps the subterranean conditions in pilot regions to identify possible locations to drill through the rock and build wells. The technology to conduct this water exploration reportedly functioned well in the pilot areas (PROASNE, 2004a). The lead partners (Serviço Geológico do Brasil, and the Geological Survey of Canada) assessed the method to be successful after the pilot studies, in achieving the aim of mapping water occurrences. The outcomes were described by one partner as "nothing less than spectacular" although their replicability is limited due to high exploration costs (Maurice & Dumont, 2003: 2, 3).

Airborne geophysical exploration is a highly complex and expensive procedure and the companies involved in its promotion (in the case of PROASNE) essentially have a monopoly on them. The advertisement opportunity seems to have been a key aim of the pilot projects: some of the actual and potential outcomes and impacts of the project that are highlighted are that "Canadian companies win new contracts to carry out similar surveys elsewhere" and "Canadian companies offer services worldwide based on a genuine test case" (PROASNE, 2005). Even excluding the way the pilot projects were used, advertisement was a central part of the project in the form of education programs. According to the partnership website, "every project activity includes a technology transfer / capacity building component which involves training [...] provided through seminars, short courses, hand-on training in Brazil and in Canada, technical visits to Canada, joint project activities, long-term support of implanted technologies, etc." (PROASNE, 2004b). The PROASNE executive evaluation acknowledges that there were several shortcomings concerning these seminars and training programs: the high cost of paying Canadian specialists to come to Brazil, meaning that they rarely stayed longer than one or two weeks, that there are very few specialists who were available for visits, severe language barriers, and lastly the unfamiliarity of Canadian specialists with the local Brazilian context, "making it difficult to address the problems directly without subjecting themselves to a lengthy learning process" (PROASNE ,2005: 55-6). While exploring water with this method appears to have been quite successful, it is not a guarantee for access to water. After a new source has been discovered using airborne exploration, wells must be drilled and water must be transported to settlements. Water thus becomes a complex product that is only accessible after a long chain of costly and complicated processes, for many of which the local communities become dependent on external support. As these observations indicate, airborne geophysical exploration has manipulative tendencies such as advertising, creating dependency, and monopolising the ways in which water can be provided.

2. Solar pumping and desalinization stations

This technology is designed to pump highly saline groundwater for un-electrified communities using solar power, and then make it potable through reverse osmosis.[7] Special motors attached to solar panels provided the electricity for water pumps and desalinization by reverse osmosis. As the technologies are powered with solar energy, they seem especially suitable for small, un-electrified communities. The partnerships associated with these technologies are PROASNE and the Global Rainwater Harvesting Collective.

The PROASNE partnership also used these solar pumping and desalinization stations as advertising opportunities to gain access to new markets, taking the form of pilot studies which, among other things, aimed to create "commercial

7 Usually, pumping and desalinization technologies are employed separately, but in the case of one CSD partnership using them, the two were linked and powered by the same energy source. As this is the case that most of the observations below are drawn from, the two technologies are discussed together here as well.

opportunities for Canadian companies and consultants" (PROASNE, 2005: 64). The high costs associated with the process can be prohibitive, and warrant a demonstration of the technologies' benefits via advertisement an education. Indeed, one report suggested that the cost of exploring water using the airborne exploration method and then installing the solar pumping and desalinization plants in suitable areas so that it can achieve a "major impact" would amount to about USD 100 million (Maurice & Dumont, 2003: 3).

A further counterproductive characteristic of this technology are the costs associated with the combined technologies. These not only severely limit its replication beyond pilot projects but also the ability to make a substantial contribution to the provision of a more reliable water supply to northeastern Brazil in times of drought. The combined solar pumping and desalinization stations are so complex and difficult to reconstruct that monopolistic tendencies and dependence may arise because the technology cannot be built locally. In cases of problems, most spare parts need to be imported (PROASNE, 2005).

Despite the manipulative characteristics suggested above, these technologies also have been appropriated by the local communities to a large extent, once implementation has started. Although initially the technologies were costly and complex, particularly because the solar-powered motors had to be imported, in the case of PROASNE, these engines were altered in such a way that they were compatible with a type of pump that is manufactured and available locally (PROASNE, 2004c). In the case of the Global Rainwater Harvesting Collective, a solar-powered reverse osmosis desalination plant was installed in India, and all except for one part of the desalination plant could be obtained locally. This indicates not only that these technologies were adaptable to local needs and constraints, but also a conscious effort to lower the costs for the end-users. Maintenance and repair by the local community is also possible. Maintenance of the solar devices is very simple, and for the reverse osmosis device a local partner was to be trained in the case of PROASNE (Jensen, 2001: 2). In the case of the Global Rainwater Harvesting Collective, a long development process for the solar-powered reverse osmosis technology lead to the development of a desalination plant "that could be managed, repair and operated by the community themselves" (The Global Rainwater Harvesting Collective, 2009). Thus, it seems that concerning the usage of these technologies after the implementation stage, communities have become more self-reliant depending on the goals and procedures of the partnership.

3. Rainwater or rock water harvesting

Rainwater or rock water harvesting is a simple, low-cost technology, which usually involves the construction of water collection and storage facilities made from easily available local materials. Rainwater harvesting exists in several variants, which differ according to factors such as collection and storage sites (rooftops, pans/ponds, subsurface dams, soil water storage systems) (UNEP, 2007: ix). Thus, different variants may be suitable to different local characteristics and rainfall conditions, for example some are suitable for dramatically improving the quality of water supplied (rooftop harvesting may prevent contamination of water where this has been a problem), or improve storage capacities in areas that experience extended dry periods alternating with excessive rainfall at other times. In addition to being very low-cost and low-maintenance, another convivial characteristic of rainwater harvesting is that it is self-limiting and reduces dependence on groundwater. In the partnerships we have studied, such as CWI, (in Kenya and Sri Lanka), the Desert Rainwater Harvesting Initiative (India), Rainwater Partnership (Sub-Saharan Africa and Asia), and the Global Rain Water Harvesting Collective (India, Afghanistan and several African countries), the technology transfer often involved small initiation costs. These partnerships highlight not only its benefits in areas where groundwater is scarce, contaminated or saline, and droughts are frequent, but also its environmental and financial sustainability (CWI; Desert Rainwater Harvesting Initiative, 2009).

Rainwater harvesting however may pose access constraints for certain parts of the communities, depending on the distance to and potential disputes over access to communal storage tanks. Concerning water and sanitation technologies in general, it is clear that "for the poor, the most dramatic impact of inadequate infrastructure may be less the result of lack of infrastructure per se but more the lack of access to that infrastructure" (Pouliquen, 2000), an observation that applies not only to access that is restricted by high prices for water and technology, but also when the location of a shared water supply is distant or disputed. This observations seems to continue to be of importance in particular in South Asia (where many Rainwater harvesting initiatives implement) and in Sub-Saharan Africa (where among other things the hand pumps discussed in the following section are implemented), as while in most other regions a substantial increase in the number of household connections has occurred since 1990, in these two regions the improvements often remained shared (WHO/UNICEF, 2010: 25). While this may not be problematic, the data suggests that thus far it does still pose substantial obstacles for the poverty-reducing benefits often associated with water, as in "in many African countries, one third of the improved drinking water sources that are not piped on premises need a collection time of more than 30 minutes" (ibid: 28), a situation which does little to reduce the water-collection burdens of women and children and allowing them to earn an income or receive an education.

According to the criteria defined by our framework, rainwater harvesting has a number of convivial qualities. In addition to their self-limiting quality, communities are involved in decisions, implementation and maintenance of the technology – their knowledge is indispensable to the projects. Regarding water quality and regularity the project designers require local help; the development and implementation of the projects are heavily dependent on communities that will benefit from these technologies. Accordingly, the projects involve different groups from communities, who are not seen as individual customers, and can appropriate the technology. Harvesting is usually free of significant financial constraints or advertisement, thus greatly contributing to spontaneous use. It is simple, replicable, and reversible. It is an inherently self-limiting technology (limited by rain fall) and enables communities to be as involved and self-reliant as possible: while it is not impossible to associate it with commercial use and service-based delivery, it is highly unlikely as it is not profitable. Communities can collect water themselves and are able to maintain and repair without having to pay or rely on external support. This makes harvesting favourable in isolated areas where both the availability of finances and adequate technical support cannot be taken for granted. It does not unnecessarily complicate water access with machines that need to be repaired, maintained, and controlled. All in all, rainwater harvesting does not seem to have manipulative properties as defined in our framework.

4. Hand pumps

Another low-cost technology, transferred especially to Africa and Southeast Asia is the hand pump. Although there are numerous types of pump-based mechanisms, (e.g. bush, rope, treadle, and fuel-powered pumps), the analysis below is based on the India-Mali Mark II hand pump, used by the West African Water Initiative (WAWI), which has dug (or rehabilitated) more than 1500 wells and fitted with hand pumps in Ghana, Mali and Niger (WAWI Secretariat, 2008: 13). Other types of pumps could be studied in a similar fashion, and would be likely to result in different levels of conviviality. In addition to WAWI, the Global Rainwater Harvesting Collective, Community Water Initiative and Total Water Programme also use pumps, often in combination with other technologies.

On the one hand, the particular choice of pump technology needs to fit the local setting (the groundwater levels, irregularities or limits of water supply etc.), which often means that any technology must be adapted to local conditions. But more importantly, the suitability of hand pumps is critically dependent on how it is implemented: for example, the cost for local communities associated with implementation and use might undermine its sustainability. Conversely, where water pumps are suitable to the context and financial capabilities, they may be a viable solution to improve long-term water access. Thus, depending on the approach taken by a partnership, the outcomes of a hand pump installation may be more or less convivial.

One manipulative characteristic are the continuous costs. In a survey, it was found that the high costs curbed the hand pump usage: while 62% of villagers had at one point paid for access to the hand pumps, only 17% continued to do so, and 80% of water was taken from other wells. Other reasons were unreliability and the time it consumed to pump water (Gleitsmann et al., 2007). The partnership that installed these hand pumps expected villages to contribute the equivalent of 175 USD per installation, furthermore in this case households desiring access to the pump had to pay regular fees and contribute to maintenance costs, which the villagers considered burdensome (ibid: 147). In this sense, the commodification of water was coupled with the treatment of the community-members as customers, resulting in high and continuous fees, and their exclusion otherwise.

Despite these discouraging examples from one study, depending on the suitability of the hand pump technology and the way it is implemented, convivial tendencies are also possible. Hand pumps are particularly beneficial for the provision of access to safer water to isolated communities on a wide scale, without dependency on external products or sources. Hand pump variants are widespread technologies, they are easily available and inexpensive, and so is their maintenance. Most importantly, they can be applied in areas far away from urban electricity and water infrastructure networks, without forcing urban technologies on rural areas, or lifestyles of the rural or indigenous peoples. If implemented, taking these characteristics into account, hand pumps can be convivial technologies.

5. Piped household connections

In urban life, running water at your tap and shower is regarded as the most desirable form of water provision. The introduction or widespread use of this water technology was by no means obvious until the twentieth century. While its introduction to urban areas appear commonsensical to our modern day perceptions, it is also an indication of how dependent the modern citizen is on infrastructure. Hence, it is important to recognise that they may have manipulative outcomes for the affected communities, depending on the context of their application. For example, its desirability has been discussed in a study of the various attempts to connect the entire population of Jakarta to water pipes since colonial times: while universal service may seem like the most desirable option, the urban poor may nonetheless not wish to be 'connected' to hydraulic infrastructures which demand specific, constrained patterns of income, land tenure, and water use which may be far less reconcilable with their volatile income and legal status than buying water from informal vendors (Kooy & Bakker, 2006). While in the expansive megacities of the South the piped water supplied to richer areas is far cheaper than the water sold through vendors and other informal channels in slums, one problem that has been observed is that the installation of regular pipes drives rent and land values up, and the original inhabitants out of an area (also because these technologies require legalisation and land registry) (Kooy & Bakker, 2006). All these points reinforce that this technology option is not automatically the most desirable, and it is important that all such possible implications are considered and addressed. Partnerships that implement this type of infrastructure are Agua Para Todos in Bolivia and WSUP in Kenya, Bangladesh, Ghana and Mali.

Water pipe installation can be costly. What is often promoted as a universal solution may become accessible to only a fraction where the costs of installation are high, or where the constraints faced by users after installation are insupportable. However, partnerships implementing this technology have attempted to find ways to limit the costs for the eventual users. Among the most common approaches are identifying innovative tariff structures, income-generating programs to help users afford the service, and offsetting the cost of installation by contributing manual labour. For example, Agua Para Todos (2008) gives customers the choice of financial contributions or mixed financial and labour contributions: users can offset part of the cost by digging trenches and laying pipes themselves. Concerning pricing structures for the water consumed that might enable access for the very poor, one recommended solution are bloc tariff pricing structures where the first bloc is provided for free

(Cleaver et al., 2005: 18), and the progressively higher prices paid for higher blocs cross-subsidize the first level. WSUP is one partnership that relied on such tariff structures to make minimum water levels accessible the poorest community members as well (WSUP, 2008). Compared to flat-rate water prices, bloc tariffs have the added benefit of encouraging water conservation. Nonetheless, piped household connections are also a rather complex technology that creates dependence of users on external actors for maintenance and provision.

There seems to be a readiness among partnerships providing piped water supplies to adapt to the often informal or even illegal situation of the inhabitants where they implement. Communities are involved in decisions regarding the final design in ways that enable them to reduce costs and allow for a communal water supply that is more easily reconcilable with the needs of the communities. For example, in the case of Agua Para Todos, communities could choose to have the piped water delivered to a community storage tank rather than having individual household connections, thus also lowering the price of the water and giving the community members a choice concerning the balance between type of access and costs implied (Heid, 2005). Indeed, local involvement also seems to be a way for these partnerships to reduce reliance on external actors. This is best illustrated by the WSUP partnership, which indicates that the international companies and organizations involved in the project implementation will retreat once the projects are fully established and sustainable, handing all maintenance and billing responsibilities over to the local private sector (WSUP, 2004, 2009).

A manipulative characteristic of many technology transfer projects is the inclusion of 'education' programmes. In the case of WSUP, education programmes are also part of the partnership's implementation plan, which may be a disguised tool for advertisement and business expansion. In the case of WSUP, it seems that these educational activities were mostly intended to increase awareness about behavioural changes that will reduce infection with diseases like diarrhoea (WSUP, 2008), however, full details on these activities are not available. Nonetheless, the possible manipulative characteristics are highlighted by other partnerships where WSUP partners such as Unilever also engage in "health education" (WSUP, 2007). Thus, a report by Unilever on another rural hygiene education partnership (Swasthya Chetna, translated 'Health Awakening') provides insights:

> "to grow in India in the 21st century will require us to extend the usage of soap beyond this relatively small group, to the 600 million Indians living in rural areas. For this to have any chance of success means that we will have to educate these people at the 'bottom of the pyramid' on why soap is important for personal hygiene." (Neath, 2006: 3)

Clearly, a secondary intention of these education programmes is for the company to extend its market access beyond the limited urban population. While the promotion of hygiene products can be easily coupled with running water, this makes the specific programme and not the technology itself manipulative. Piped connections often have convivial characteristics, suiting the lifestyles of the local population and reducing exclusion due to excessive pricing.

6. Sodium hypochlorite disinfection

While they are not directly related to water provision, water disinfection technologies also have implications for accessibility of drinking water. Partnerships promoting such measures are the CWI (in Sri Lanka) and Safe Water System (in Africa, Asia, Central and South America). Sodium hypochlorite is the most widely used water disinfection agent, providing point-of-use disinfection of potentially contaminated water. In these partnerships, it is coupled with a suitable carrying and storage device, and "behaviour change techniques" aimed at demonstrating the value of disinfecting water (Safe Water System, 2008). Disinfection is needed when there is no water infrastructure and communities rely on potentially contaminated water from ponds and wells, or where not everyone can afford access to the existing infrastructure.

While SWS was only initiated in 2002, several of its members, including the US Center for Disease Control and Prevention (CDC) and Procter & Gamble (P&G), have been involved in the development of disinfection products and in a number of partnerships intended to promote them. P&G has been developing portable products to make existing water sources safe for use since the cholera outbreaks in the early 1990s, but the products had difficulties in becoming accepted by the communities they were intended for: attempts at using a filter were unpopular because it clogged fast, and sales of its first soluble disinfectant, PUR, remained low (despite proven record of reducing potential water-borne diseases and low prices) due to the taste and colour of the treated water (Hanson, 2007). Later, PUR was reintroduced through several partnerships "to test three marketing strategies: social marketing, commercial marketing and disaster and humanitarian relief networks", and eventually succeeded at selling the product to non-profit organisations for humanitarian relief purposes: it seems that the partnership helped make this product commercially viable (ibid).

Water disinfection products are also associated with much advertisement (often in the form of behaviour change or hygiene education) and advertisement-related costs. Indeed, if the partnerships to promote PUR are any indication, it seems that SWS's "behaviour change strategies" might be considered a successful marketing strategy. The advertisement efforts of P&G in regard to making PUR commercially viable included employee campaigns (to buy PUR as donation) and introduction of the product to the NGOs working on disaster relief. Hence, it is difficult to argue that the advertisement campaign was to create a certain need that would manipulate the users, but rather the buyers. On the other hand, P&G's strategy was not to limit the use of PUR to such emergencies, but to make it abundant and accepted such that it would become a product of convenience in areas with water scarcity. It is in this sense that sodium hypochlorite disinfection approximates a manipulative technology. Despite the relatively low costs of the product, at least one study found that in Malawi the cost associated was considered prohibitive (Stockman et al., 2007: 1077).

A convivial characteristic that may be associated with water disinfection is that such products are not associated with their own overuse or increased use of water; they simply make existing sources of water safer for use and consumption under extreme circumstances, particularly in disaster hit areas. Despite its simple application for the end-user, the users have no influence on the chemical design of the product, and it is universally applied instead of being customised for each particular disaster zone.

Conclusions

Assessing the legitimacy of technology transfer by CSD water partnerships by the new framework implies three sets of conclusions; about the framework itself, about the technology transfer process, and about partnerships in relation to these technologies.

The assessment framework

Convivial technologies run the risk of appearing less appealing than technologies that tend towards manipulation, such as piped water. This is mainly because they are small-scale projects which cannot be replicated universally, and more importantly, since they frustrate the image of bridging inequality that development aid often suggests. Nonetheless, when the results of our assessment with the new framework is checked against the existing literature we see that at least two studies supported the framework's assumption that convivial technologies have higher social acceptability (Gleitsmann et al., 2007; Heid, 2005). Recipient communities prefer accessible, flexible, and free- or low-cost sources of water, even if access is less convenient over resources that are costly or that require frequent repairs by professionals.

The choices of the communities appear to be influenced by a complicated web of factors rather than the price. In this sense, the assessment framework proved useful in enriching the dimensions on which poor communities and users make decisions. *Agua Para Todos*, for instance, demonstrates that the price factor is one among many: the local communities supplied with the pipes preferred to have the water in a communal tank from where they would purchase it individually, according to their needs and abilities. The price difference might be one factor here (US$0.25 per m3 versus US$0.45 per m3) embedded in a host of other social factors, such as fluctuating incomes, being able to rely on communal availability of water, etc. It proves to be a research bias to assume that the social acceptance of the technology by poor communities is solely determined by the price of the water provided (possibly because price information is easy to access for the researcher).

On the other hand, the fact that the less appealing technologies tend to be more convivial also masks another issue that needs to be highlighted: while partnerships such as *Agua Para Todos* succeeded in extending water access to more users by lowering costs, this also involved compromising on the issue of communal vs. household connections, and relying on voluntary labour by the community to keep the prices low. What this glosses over is that in the same urban area of implementation, official water utilities provide subsidized household water access to richer neighbourhoods, while leaving the poorer, less profitable neighbourhoods to be helped by partnerships and NGOs. Thus, "the creation of parallel networks entrenches the fragmentation of the water supply system, creating two tiers of service with vastly unequal levels of state support [...] in celebrating community resourcefulness, we risk condoning both government inaction and corporate misconduct." (Bakker, 2008: 239). Perhaps the lack in legitimacy of technology transfer by some of the partnerships examined here is still rather insignificant compared to the failure of the responsible official public water utility or private concession to provide long-term sustainable water access in these poor areas.

Other than these specific observations, the framework appears operant in suggesting the legitimacy (in terms of social acceptability and enabling of autonomous citizenry) of the technologies transferred. While including the economic dimension, it does not reduce this dimension to prices, and instead scrutinises the effects of technologies to the economic organisation of communities systematically. Moreover, the indicators also point to the *potential* systematic effects of a technology, rather than focusing on the effectiveness logic that is omnipresent in the development aid narratives of the United Nations. In this sense, the framework discredits the win-win argument that is at the core of technology transfer through partnerships. On the other hand, the framework gives mixed results when a technology has various applications, such as the hand pumps and the solar pumping and desalinization stations. Depending on the implementation the inclusion of communities in decision making as well as flexibility and price can change considerably in some of these technologies. In short, the framework suggests that some technologies (regardless of their application) are manipulative due to complex and expensive production and professional use and maintenance procedures, while others with mixed characteristics remain contingent on the application by the partnership.

The technologies transferred[8]

The analysis reveals sufficient variance among technologies that tend towards the manipulative side of the spectrum than the convivial end. What does this tell us about the different technologies? It is not that those on the convivial end are without faults, as we identified flaws not related to the framework with technologies such as rainwater harvesting. However, considering their impact on the societies involved and provision of access for the poorest sections, convivial technologies seem to fare much better than manipulative ones such as piped water or solar water pumping. Technologies such as rainwater harvesting are essentially tools for spontaneous use, the users of which define how they are used, and communities remain self-reliant in their water governance. These technologies are not associated with a strong potential for commercialization or service provision. Technologies where convivial characteristics prevail most clearly are rock and rainwater harvesting, while airborne geophysical exploration and water disinfection had the most manipulative characteristics. The rest (piped water, hand pumps and solar desalination) have both convivial and manipulative attributes, mostly because the outcome on one or the other

[8] For a table summarizing manipulative and convivial implications of technologies, see Annex 1.

side of the spectrum is in these cases heavily dependent on the way the project is implemented. The partnerships examined demonstrated that there is at least some potential for adaptation of the technology so that spontaneous use and self-reliance are likely (e.g. communities can take care of maintenance).
Furthermore, we do not suggest that piped water, for instance, is in every instance less desirable than rainwater harvesting. In areas where absolute poverty is rare, access to and payment for tap water is possible for nearly everyone. Neither is it intended to discredit the work of partnerships that transfer technologies on the manipulative end of the spectrum, piped water or solar pumps or even desalinisation projects appear to have been appropriated by some of the communities and even constructed locally.

Partnerships transferring technologies

The assessment framework assumes that heteronomous technologies provide services that are often not absolutely necessary, and as a result having to resort to manipulative actions such as advertisement to entice communities to invest in them, thus creating false public utilities. This was most obviously exemplified in airborne geophysical exploration, and in the non-emergency use of PUR. The costs associated with the promotion of these technologies limit access, not only making the technology an exclusion mechanism, but also indicating its counterproductivity as the aim appears to be (the universal) provision of water in the first place. For such technologies, partnerships offer an opportune platform: Even when their affects are contrary to their initial aims, these technologies can, through partnerships, assume a therapeutic and compassionate image to mask this paradoxical effect, which according to Illich is another feature of counterproductivity. The separation of end-users and buyers (donors) in the case of PUR was a strikingly effective strategy for P&G in this regard, while other examples are the use of pilot projects as advertisement by PROASNE and education strategies in general.

Moreover, the technology transfer is assumed to be identical to 'having water to drink' which has implications for the implementation deficit in water governance. For example, in one case it was suggested that the key aim in the NGO head offices seemed to be meeting the WHO water quality standards with their technology choices, but they failed to adapt and implement it in such a way that the amount supplied could sustain an entire village (Gleitsmann et al., 2007). The consequence in this case was that villagers continued to make use of more abundant water sources with lesser quality. Other than the quality versus quantity dimension, even when the number of people that gain access to water may increase as a result of these projects, their ability to initiate solutions to problems that they define themselves may simultaneously be curbed. The dependence of the communities on some partnerships concerning all design and implementation-related issues is an indication of this.

Another role that partnerships assume in the process of technology transfer is more subtle, but equally important: They become a process through which flexibility reappears. In this sense partnerships may end the closure and the consensus over the technology in question (that took place in the society of origin), and re-introduce interpretive and even design flexibility. Even some of the technologies with some manipulative characteristics (such as piped water or solar pumps or even desalinisation projects) have been appropriated by the receiving communities and made locally constructable *during* the implementation process. The extent to which this is due to partnership organisation or the technology in question would be an appropriate next step in the development of our assessment framework.

The promotion of a manipulative technology by a certain sector of the receiving community (or sometimes by external NGOs or governments) implies two things: Firstly, they mean that diverging interests have not been reconciled in the partnership process, although it looks participatory. This can be termed *the paradox of selective participation* in partnerships, resulting from the assumption of democratic legitimacy based on stakeholder representation. Secondly, it indicates that preferences for a specific technology are often “hard-wired” into development politics even where more suitable options would be possible and available (Lowell, 2000, in Moriarty et al., 2004: 34). In this sense, partnering as a governance arrangement is transferred into the logic of the communities that are receiving development aid. As a business representative at CSD suggested:

> “Everybody is leveraging the others. [...] What is your alternative? Your alternative is non-partnering, which, you know...doesn't sell well...”[9]

Although this does not directly denote disempowerment of the communities in question, it certainly implies that partnerships become a part of the package that is transferred, which not only includes the transferred technologies but also the political and social arrangements that they are embedded in. Hence, inefficiencies and failures in partnerships can as well be interpreted as the resistance of the poor communities to the imported logic of governance through partnerships, technology transfer and the win-win logic.

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[9] Personal communication with business representative to CSD.

References

Agua Para Todos. (2008). from http://www.aguatuya.com/html/water_for_all.html
Arendt, H. (1958 [1998]). *The Human Condition*. Chicago & London.
Bäckstrand, K. (2006). Democratizing Global Environmental Governance? Stakeholder Democracy after the World Summit on Sustainable Development. *European Journal of International Relations, 12*, 467-498.
Bakker, K. (2008). The ambiguity of Community: Debating alternatives to private-sector provision of urban water supply. *Water Alternatives, 1,* 236-252
Beisheim, M., Campe, S., & Schäferhoff, M. (2009). Global Governance through Public-Private Partnerships. In M. Zürn, S. Wälti & H. Enderlein (Eds.), *Handbook on Multi-Level Governance*. Cheltenham.
Bijker, W. E., & Pinch, T. J. (1984). The Social Construction of Facts and Artefacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other. *Social Studies of Science, 14*, 399-441.
Campe, S. (2008). *Complex Problems, Easy Failures: Why Transnational Water PPPs Move onto the Next Phase*. Paper presented at the International Studies Association's 49th Annual Convention "Bridging Multiple Divides".
Cleaver, F., Franks, T., Boesten, J., & Kiire, A. (2005). *Water Governance and Poverty: What Works for the Poor?* Bradford: Bradford Centre for International Development.
CSD (2006). *A Gender Perspective on Water Resources and Sanitation. Background Paper No. 2*. New York: Commission on Sustainable Development.
CWI. Community Water Initiative Project Portfolio Overview. from http://www.energyandenvironment.undp.org/undp/indexAction.cfm?module=Library&action=GetFile&DocumentAttachmentID=1796
Desert Rainwater Harvesting Initiative. (2009). Desert Rainwater Harvesting. from http://www.yogaindailylife.org.au/Humanitarian-Care/Care-Projects/Desert-Rainwater-Havesting.html
Feenberg, A. *Subversive Rationalization: Technology, Power and Democracy with Technology*.
Feenberg, A. (2004) *Democratic Rationalization*. Readings in the Philosophy of Technology. David M. Kaplan. Oxford: Rowman & Littlefield, 209-225.
Finger, M., & Allouche, J. (2002). *Water Privatisation: Trans-national Corporations and the Re-regulation of the Water Industry*. London & New York: Taylor & Francis.
Ghose, R. (Writer) (2006). From Waste to Water: Greywater Reuse in the Middle East [Video]. In W. UPE, IDRC, CIDA, IFAD (Producer).
Gleitsmann, B., Kroma, M., & Steenhuis, T. (2007). Analysis of a rural water supply project in three communities in Mali: Participation and sustainability. *Natural Resources Forum, 31*, 142-150.
Hall, D., & Lobina, E. (2002). *Water privatisation in Latin America*. Paper presented at the PSI Americas' Water Conference. from http://www.dev-zone.org/kcdocs/6154latam.pdf
Hanson, M. (2007). Pure water. Retrieved December 12, 2009, from http://www.managementtoday.co.uk/news/647187/
Illich, I. (1970 [2002]). *Disabling Professions*.
Illich, I. (1971). *Deschooling Society*. New York: Harper & Row.
Illich, I. (1973). *Tools for Conviviality*.
Illich, I. (1974). *Energy and Equity*.
Illich, I. (1975). *Limits to Medicine: Medical Nemesis, the Expropriation of Health*.
Illich, I. (1978). *Toward a History of Needs*.
Illich, I. (1985). *H2O and the waters of forgetfulness*.
Jensen, E. (2001). *Northeastern Brazil Groundwater Project Field Report*. Alberta: Sunmotor International Ltd.
Kooy, M., & Bakker, K. (2006). Zersplitterte Netzwerke? Wasser, Macht & Wissen in Jakarta: 1870-1945. In S. Frank, Gandy, M. (Ed.), *Hydropolis- Wasser und die Stadt der Moderne* (pp. 265-293). Frankfurt: Campus.
Maurice, Y., & Dumont, R. (2003). *Extended Abstract: Groundwater Exploration and Management in Brazil*.
McDonald, D. A., & Ruiters, G. (2005). *The Age of Commodity: Water Privatization in Southern Africa*. London: Earthscan.
Moriarty, P., Buttersworth, J., van Koppen, B., & Soussan, J. (2004). Water, poverty and produtive uses of water at the household level. In P. Moriarty, Buttersworth, J., & van Koppen, B. (Ed.), *Beyond Domestic: Case studies on poverty and productive uses of water at the household level* (pp. 19-47). Delft: International Water and Sanitation Centre.

Neath, G. (2006, April 10, 2006). *Business as a Partner in Reaching the Millennium Development Goals.* Paper presented at the Business, NGO & Development Conference, World Bank Washington.
Pouliquen, L. (2000). Infrastructure and Poverty. Draft Paper. from http://siteresources.worldbank.org/INTPOVERTY/Resources/WDR/Background/pouliquen.pdf
PROASNE. (2004a). Airborne Geophysical Surveys. Retrieved January 8, 2009, from http://proasne.net/airbornesurvey.html
PROASNE. (2004b). Northeastern Brazil Groundwater Project (PROASNE). from http://webapps01.un.org/dsd/partnerships/public/partnerships/847.html
PROASNE. (2004c). Solar Power Development Project. from http://proasne.net/solarpower.html
PROASNE. (2005). *Closing Report*: Geological Survey of Canada/Serviço Geológico do Brasil.
Rai, V. (2002). IF WEHAB Today, We Have Tomorrow. from http://www.un.org/Pubs/chronicle/2002/issue3/0302p7_perspective.html
Rainwater Partnership. (2008). Rainwater Statement. Retrieved February 24, 2009, from http://www.unep.org/depi/rainwater/
Safe Water System. (2008). from http://www.cdc.gov/safewater/
Schäferhoff, M., Campe, S., & Kaan, C. (2009). Transnational Public-Private Partnerships in International Relations: Making Sense of Concepts, Research Frameworks, and Results. *International Studies Review, 11*, 451-474.
Sclove, R. E. (1995). *Democracy and technology*. New York: The Guildford Press.
Short, T., & Thompson, P. (2003). Breaking the mould: solar water pumping - the challenges and the reality. *Solar Energy, 75*, 1-9.
Heid, E. (2005). *Case Study Project: Agua Para Todos - Water for All.* Berlin: GPPi.
Stockman, L., Fischer, T., Deming, M., Ngwira, B., Bowie, C., Cunliffe, N., et al. (2007). Point-of-Use Water Treatment and Use among Mothers in Malawi. *Emergin Infectious Diseases, 13*, 1077-1080.
The Global Rainwater Harvesting Collective. Sweet Drinking Water- The First Solar Powered De-Salination Plant in Rajasthan. Retrieved January 2, 2009, from http://www.globalrainwaterharvesting.org/desalination.asp
UN. (2006). The 2nd UN World Water Development Report: 'Water, a shared responsibility'. from http://www.unesco.org/water/wwap/wwdr/wwdr2/table_contents.shtml
UNEP. (2007). *Mapping the Potential of Rainwater Harvesting Technologies in Africa: A GIS overview on development domains for the continent and ten selected countries. Technical Manual No. 6.* Nairobi: UNEP.
WAWI Secretariat. (2008). WAWI Final Evaluation Report. from http://www.wawipartnership.net/wawi_implementation.php
WHO/UNICEF. (2004). *Meeting the MDG Drinking Water and Sanitation Target. A mid-term assessment of progress*. New York: WHO & UNICEF.
WHO/UNICEF. (2010). Progress on Sanitation and Drinking-water: 2010 Update. New York: WHO & UNICEF.
WSUP. (2004). *Water and Sanitation for the Urban Poor (WSUP): Working in Partnership to progress delivery of the UN Millennium Development Goals for Water and Sanitation*. London: WSUP.
WSUP. (2007). Frequently Asked Questions. Retrieved June 5, 2009, from http://www.wsup.com/intro/faq.htm#05
WSUP. (2008). *Report from the Programme Implementation Workshop*. London: WSUP.
WSUP. (2009). *How can water and sanitation services to the urban poor be scaled up?* London: WSUP.
Žižek, S. (2001). *The Fragile Absolute – or, Why is the Christian Legacy Worth Fighting For?* . London: Verso.

Annex I

	Convivial characteristics	Manipulative characteristics
Airborne geophysical exploration		- pilot projects serve as an advertisement opportunity - the technology is costly and complex, additionally further investments (into drilling etc.) are needed before water is obtained - monopolistic tendencies
Solar pumping & desalinization	- adaptation to communities needs in price and construction is possible, users thus could remain free agents - self-reliance may be possible where all parts necessary to construct/repair the technology are locally available	- pilot projects serve as an advertisement opportunity - the technology is costly and complex - dependence continues where not all parts necessary to maintain the technology are easily available
Rainwater harvesting	- spontaneous use: no advertisement or notable financial constraints are involved in the projects - self-limiting: its inherent characteristics (no service or commodity) make commercial exploitation less straightforward and overuse unlikely - self-reliance: low-maintenance, easily replicable, community-based	
Hand pumps	- may be a tool for spontaneous use due to low costs, easy maintenance and adaptation to local conditions and that it can facilitate water access in remote areas	- where it is cost-associated, the financial burden falls on users - dependence: where the design is not adapted to local requirements, hand pump breakdowns are frequent. Repair is difficult and maintenance requires outside help.
Piped water	- there is room for adaptation of the technology to local needs and requirements	- costly process: water access involves payment for water services, and potentially payment for infrastructure installation.
Water disinfection		- advertisement and education to convince of necessity, masked as “behaviour change techniques” - monopolistic characteristics, as only one company produces the product - dependence: users must buy new disinfection product regularly

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11 *Proceedings of the 2002 Berlin Conference on the Human Dimensions of Global Environmental Change: 'Knowledge for the Sustainability Transition. The Challenge for Social Science'.* Edited by Frank Biermann, Sabine Campe and Klaus Jacob. 2004. ISBN 3-00-014956-2.

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The Democratic Legitimacy of Global Public Policy Networks. Analysing the World Commission on Dams. By Klaus Dingwerth. Global Governance Working Paper No 6 (English version). 2003.

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