WaterAid learning for advocacy and good practice

Water and sanitation mapping: a synthesis of findings

WaterAid/Abir Abdullah

A WaterAid report

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WaterAid country programmes increasingly use mapping as a tool to support their ongoing work in-country. Mapping is used as an advocacy tool as a way of providing citizens and local governments with information and arguments to demand improved services and, on an operational level, to improve the sustainability and equity of service delivery. Although mapping is still in a pilot phase in many countries, it has already gained considerable popularity across different country programmes. The objective of the WaterAid learning for advocacy and good practice: water and sanitation mapping project is to support learning around these emerging practices by documenting different approaches and by identifying factors that inhibit or facilitate the uptake of mapping information in policy processes. According to WaterAid's Terms of Reference (2005)[1], this project intends to

- Clarify the objectives and target groups of mapping in different countries;
- Highlight differences in methods and approaches to mapping in different countries including technical, financial and human resource inputs
- Assess the strengths and weaknesses of different mapping approaches with an emphasis on the challenges surrounding the use of GIS technology and
- Assess the impact that mapping has had on policy processes.

While these different aspects are dealt with in detail in the various reports accompanying the field work, this synthesis will draw together the main lessons from mapping based on the findings of five case studies and provide recommendations for the way forward.[2]

1. Mapping experiences at WaterAid – a brief overview

Across WaterAid country programmes, there is not one major mapping approach but rather a multiplicity of different approaches that have emerged in response to the specific local political contexts and to the strategic objectives of the respective country programmes. Based on the six case studies, three main types emerge: water point mapping in rural areas in Malawi and Tanzania, water and sanitation mapping under the Localising the MDGs Initiative (LMDG-I) in West Africa and different types of urban water and sanitation mapping by the Orangi Pilot Project (OPP) in Pakistan and by WaterAid in Nepal in the Kathmandu Valley.[3]

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[1] WA (2005): WaterAid Water and Sanitation Mapping: Learning for Advocacy and Good Practice. Terms of Reference, 29 July 2005
[2] The information is based on field visits to six countries: Ghana, Malawi, Nepal, Nigeria, Pakistan and Tanzania.
[3] The main features and steps of mapping in Ghana, Nigeria, Malawi and Tanzania are summarised in Annex 1.

Water point mapping in Malawi and Tanzania focuses on improved water points in rural areas with an emphasis on an equitable distribution of services.[4] Tanzania's methodology builds on the experience from Malawi; the main difference consists of the participation of a private sector company in mapping.

The objectives in both countries are to improve planning and monitoring of water service delivery at district and sub-district level. The main target groups are the water supply and sanitation district personnel and key planning staff at district level. Mapping had not established a direct link to sub-district institutions and communities at the time of the field visit. The method used for information gathering is the GPS location of improved water points in addition to a short questionnaire inquiring basic technical and management issues. The mapping process is only marginally participatory in the sense that a small number of local government staff are involved in data collection. Data analysis and report writing are done by WaterAid and/or mapping partners with a feedback session to validate results and to introduce the basic IT features of the GIS software.

Water and sanitation mapping in West Africa forms the backbone of the Regional Localising the MDGs Initiative. In addition to water mapping it also includes sanitation and community mapping. Mapping is mainly applied to rural areas but also used in small towns in some cases. As in Malawi and Tanzania, the objectives are to improve planning and monitoring of service delivery at the district level but with a greater emphasis on empowering citizens and building on and strengthening the decentralisation process at and below the district level. In addition, mapping is also seen as a fundraising tool. The methodology used follows in broad lines the mapping methodology in Malawi and Tanzania but puts a much higher emphasis on socio-economic data collection and on participatory processes. Feedback sessions are carried out at district and sub-district level to prioritise future actions on water supply and sanitation.

In Asia, **water and sanitation mapping** focuses on urban areas. In Nepal, a number of parallel mapping approaches have emerged with different objectives and audiences. The most important mapping process is linked to the urban water reform process in Kathmandu Valley. It distinguishes itself from mapping in sub-Saharan Africa in that it puts an emphasis on identifying and enumerating the poor pockets of the population as well as their water sources. This responds to a reality where poor and better-to-do citizens live door to door making it more important to develop tools for targeting those in need. Sanitation mapping at the Orangi Pilot Project Training and Research Institute (OPP-RTI) is radically different from the above approaches. OPP-RTI's mapping is predominantly applied to document sewerage systems in urban informal settlements. Mapping is inherently linked to OPP's wider philosophy of supporting people in their own

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[4] In Malawi, the country programme has also started mapping of water kiosks in urban areas, which has not been documented as part of this project.

development efforts. As such, the most immediate purpose of mapping is to provide neighbourhoods with a support tool for developing their own sewerage systems. Based on this, OPP-RTI has developed what it calls the "internal-external sanitation model" which postulates that the government should complement people's own efforts in developing low-cost solutions to sanitation. With the growing application of OPP-RTI's model in Karachi (and elsewhere in Pakistan) over the last 25 years, the organisation's mapping objective has also turned towards influencing the activities of specialised government agencies and local government. OPP-RTI's mapping techniques are very simple and low cost.

Mapping inputs

This section gives a brief overview over the inputs involved in mapping in the five countries. The main points are summarised in Table 1, which takes the inputs required per district as the point of comparison.

The **costs** for carrying out water and/or sanitation mapping a district range between £4,000 and £7,000 in sub-Saharan Africa. This is a comparable figure if we take into account the differences in geographical and population sizes per district between different countries. Districts in Nigeria tend to outsize by far a typical district in Ghana or Malawi.[5] In Asia, the costs were generally much lower mainly because of the use of different methodologies.

Table 1: Indications of mapping inputs required per local government				
Country	Administrative unit	Costs[1] in GBP	Time	Human resources[2]
Ghana	district	~ 5,000	3 – 5 months	100 - 200 community members ~ 25 local government staff 3 – 5 Afram Plains Development Organisation (APDO) staff
Malawi	district	5,000 – 10,000	3 months	4 LG staff 1 WA staff 1 – 2 Mapping partner staff
Nigeria	local government	~ 7,000	3 – 4 months	~ 30 LG staff 2 – 3 WA staff 1 – 2 WaterAid partner staff
Tanzania	district	~ 4,000	6 – 8 weeks	1 LG staff 1 Private Sector staff Regular input from WA
Pakistan	union council	~ 100	3 months	1 – 2 OPP-RTI staff
Nepal (Urban	Municipalities of Kathmandu	10,000 (does not	5	3-4 engineers

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[5] The higher costs in Malawi are partly the result of conservative cost estimates.

Reform Process)	Valley	reflect real costs)	months	30-40 volunteers
Nepal (Stone Spout mapping)	Municipalities of Kathmandu Valley	Mainly relying on volunteers		1-2 volunteers
Nepal (Poverty mapping)	Communities within municipalities	unknown	3 months	4 civil engineers, 2 assistants, ~30 enumerators
Note: These figures are indications based on experiences in these countries rather than precise average figures. They may vary depending on the size of the local government, the change of the process/methodology, etc. [1]The financial inputs exclude set-up costs such as purchase of software and hardware etc. [2]Human Resources inputs vary over time; the high human resources input in Ghana and Nigeria was limited to the data collection carried out within a period of 1 – 2 weeks.				

The **time** required to carry out mapping in a particular district is, with three to four months on average, approximately the same across sub-Saharan Africa and for poverty mapping in Nepal, which is based on a similar methodology.

Major differences arise with regard to the **human resources** reflecting the degree of participation of local staff in the exercise. In those cases where participation of local staff and communities is high, more time is spent on training and on the analysis in order to incorporate as many people as possible while the actual data collection process is shortened.

In terms of **technical inputs**, GIS technology was used in all cases except for OPP-RTI's approach in Pakistan and stone spout mapping in Nepal. But, the role of GIS for feedback varied between different countries. While GIS was crucial in Malawi and Tanzania, the socio-economic data set played a more important role in Nigeria and Ghana and in Nepal.

The use and impact of mapping information

In Tanzania, Ghana and Nigeria, mapping was still in its very early stages at the time of the visits, which naturally limited the impact on policy processes. Yet, there are some emerging practices that indicate differences.

In Nigeria, mapping was taken up enthusiastically at a national conference in December 2005 with all present local governments agreeing to contribute

resources to the process (WaterAid in Nigeria et al, 2005)[6]. Yet, the practical uptake of mapping differs between the local governments where mapping has been carried out. In two of the three visited local governments (Gwer West and Kanke), the awareness about water and sanitation had grown within the districts, which led to the establishment of water and environmental sanitation (WES) units. In the third local government (Dass), the commitment went further: a separate WSS budget line was created and mapping results were used to identify water points for rehabilitation.

In Ghana, mapping went through a long pilot phase in the Afram Plains district, which increased demand for services from citizens and sub-district administrations. The results also started to have an impact on cross-sector district-wide planning processes in 2006.

In Malawi, where mapping started in 2002, the use varies widely between districts. While at least one district uses and updates mapping information for water supply service delivery, other local governments are not even aware of the information.

In Nepal, the mapping and enumeration of squatters, slums and public stand posts under the urban water sector reform process played an important role in reaching a common understanding among the government, donors and civil society organisations about the number and water supply needs of poor city dwellers. As a result, the infrastructure design for the future Kathmandu Valley water supply network envisages a number of public stand posts managed by community-based organisations. However, no action had been taken as of January 2007 because the reform process continued to be stalled.

In Pakistan, where the experience is quite unique, mapping has had profound repercussions on sanitation in Karachi over the last 25 years. In Orangi alone, maps have provided the basis for 1 million people getting access to sanitation. In addition, mapping also had a high impact on policy processes. It led, for example, to the cancellation of an ADB-funded waste water project in Karachi. In 2006, OPP's chairman was invited by the government to draft the national sanitation policy, which now incorporates OPP-RTI's principles.

The variation in use depends largely on WaterAid country programmes and partners' conceptual approach to mapping. There are a number of lessons that emerge from the experiences across the five countries that could assist in thinking more strategically around mapping in the future. They are outlined in the following section.

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[6] WaterAid Nigeria et al (2005): Partnering with Local Authorities and the Millennium Development Goals. Communiqué;
http://www.wateraid.org/documents/lmdgi_conference_communique_pdf.pdf

2. Lessons learned

One would imagine that the message of a map that clearly conveys where water and sanitation services are needed is readily taken up by policy makers and other stakeholders. The opposite is true in reality. One of the overarching lessons is therefore that a map is but a small mosaic stone within a wider and long term engagement with the view of influencing policy. Different aspects determine how well mapping evidence is taken up. In the following, these are divided into three categories: (1) **evidence** deals with the tool itself; (2) **process/links** focuses on how the tool is employed and (3) relates mapping to the surrounding **political context**, which can limit or facilitate the use of mapping information.

Evidence

Identification of objectives and target groups: the definition of clear objectives and target groups is an important first step to create a common understanding and clear focus of mapping. One fine but crucial difference in objectives is whether mapping is seen as a planning, monitoring and fundraising tool at district level or whether the intention of mapping is also to empower citizens/communities. This has important implications for the design of the mapping process. If empowerment of citizens is sought, then large scale participation along the lines of the Afram Plains Development Organisation (APDO) in the Afram Plains is most appropriate. A clear understanding of the potential differences in objectives and target groups is also critical when collaborating with other stakeholders. In Malawi, for example, the different objectives of mapping partners led to variations in involving and informing local governments about the process.

Design of the tool: Once objectives and target groups are identified, it is important to design the tool in such a way that it maximises results. For example, if empowerment of citizens is the objective, then citizens' participation and information is crucial. An interesting side effect in the case of APDO's mapping in the Afram Plains was that the sensitisation campaigns around sanitation and hygiene behaviour accompanying mapping in each community, were highly appreciated.

An important aspect here is to make the tool compatible with its prospective users. GIS mapping is a technically demanding activity that cannot easily be employed at district level. In Malawi, where district staff received GIS training and had the software installed, only the local government, which was regularly supported by WaterAid, continued to make use of it. Furthermore, GIS-based maps are more important for district and regional planning purposes than for advocacy at sub-district level. The question arises which format of information is most effective at which level? For example, GIS could be used by water and sanitation agencies at regional level whereas it can be used for the simple calculation of figures at district level. This also makes the updating of information more feasible. The example from the Afram Plains shows that figures can have a high impact, too. In the Afram Plains the ranking of different sub-districts

according to their number of sanitation and water facilities turned out to be a very effective lobbying tool at sub-district and district level. The bottom line for the design of any methodology is thus the capacity of the users. If, at district level, people barely have skills to use word and excel programmes, it is not conducive to introduce GIS.[7] A good way of facilitating use could be the development of a simple user guide, which was done by APDO.

Quality assurance: Accuracy of information determines the credibility and overall standing that mapping has at any level. It thus goes without saying that quality insurance of evidence is crucial. From interviews, it seems that sound principles and processes for cross-checking information have been established in all visited country programmes. Yet, with increased pressure on WaterAid staff and partners to scale-up mapping, there is a possibility that quality might suffer. Similarly, only regular updating of information enables the sustainability of mapping. Yet, in most cases, there are no clear strategies and financial resources to guarantee continuity.

Maps: Maps can potentially convey very powerful messages. As with any other form of evidence, they can therefore also be misleading depending on how information is presented. The less background information a map provides the higher is the potential to convey one-sided messages. At the same time, it is also important not to overload a map with information, which then weakens the key message. There is also a question around which information is usefully depicted by a map. A map showing household sanitation facilities does not communicate the same strategic message as a map showing water facilities. Finally, mapping messages also have limitations. For example, the fact that maps do not portray changes in hygiene behaviour was highlighted during the LMDG-I conference in Accra.

Links/process

Who creates the maps: The agency who maps decides what to map, and how and to whom to provide information. The 'mapper' thus becomes an important gate keeper since the map will reflect his/her concerns. OPP-RTI's experience with the Karachi Water and Sewerage Board (KWSB) teaches an important lesson in this regard. KWSB used its own maps for the design of a major waste water project in Karachi. Instead of depicting all existing waste water infrastructure including people's own dug sewerage lines and the systems put in place by other agencies, the map only showed infrastructure constructed by KWSB. This highly limited the outcomes of the project, which only enabled less than 1/10 of the total households to connect to the system.

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[7] One intermediate step could be the use of DevInfo (or similar softwares), a user-friendly tool developed by UNICEF that makes the creation of simple maps possible by a few mouse clicks.

The question of 'who maps?' also has important implications for the institutionalisation of mapping. Mapping can threaten established practices of allocation of services in countries where decentralisation processes have not taken hold (yet). Thus, if mapping is institutionalised with local and higher government agencies, which incentives will these agencies have to encourage citizens to hold them into account? This begs the question whether an independent actor such as WaterAid or WaterAid's partner do have a long term role to play in facilitating citizens' information and engagement?

'Seeing' is not 'believing': As indicated in the beginning, not just the map, but the process around it is crucial in order to improve the targeting of poor people and the sustainability of service delivery. The case studies have shown throughout that the importance of process and follow-up cannot be over-emphasised. For example, in Nigeria, the district where WaterAid's local partner had developed a good working relationship and continuously followed up on the mapping results, had seen the most substantial changes. For example, the local government created a separate budget line for water supply and sanitation and provided 300 sacks of cement for latrine construction in addition to using mapping information for allocating boreholes within the district. These activities are not the result of the local government's change of mindset after being involved in the mapping process alone. They rather are the outcome of hard and continuous lobbying work by WaterAid local partner after the completion of the report.

The political context

Decentralisation and sector reform progress: The level of decentralisation and sector reform processes differ between countries. For example, in Ghana, local governments do receive regular budget allocations in order to carry out local development investments whereas in Nigeria, the local level decision makers often have very few resources in their hands and water supply projects are still partly carried out by regional agencies. Yet, in all cases, there is a discrepancy between the policy on paper and the reality in practice. Budgets arrive late, implementation manuals are not followed and new roles are not adhered to. Thus, mapping, which supports planning at the local government level, often builds on a rather weak or non-existent process. This implies important challenges for mapping processes.

Capacity constraints: In addition, serious capacity constraints are the norm at local government level, which impede local government staffs ability and commitment to carry out additional work. In many cases, staff salaries are in arrears and support infrastructure is weak. It is not uncommon that water officers have no means of transport nor fuel or per diems to visit water supply and sanitation facilities on site. In addition, in some countries, the water sector is also structurally weak at the local level. In Malawi and Nigeria, for example, the water office falls under another department, with no separate budget line and decision

making powers. Water officers themselves often have only a secondary education and no computer skills. In addition, the frequent turn-over of staff at district level, inhibits the sustainability of mapping processes since it implies a frequent and substantial loss of institutional memory.

3. Opportunities and challenges

Mapping in itself is not an entirely new practice. GIS mapping has been used in the past to identify and analyse levels of service delivery as well as for many other aspects inside and outside development contexts. Also, participatory mapping is not an innovation; it shares, for example, many aspects with participatory rural appraisals.

The new and exciting aspect of mapping is its linkage to existing policy processes, especially in the case of the Localising the MDGs Initiative. Mapping responds to a number of important shortcomings of existing approaches to poverty reduction, i.e. the MDGs and Poverty Reduction Strategy processes. The mapping process breaks the MDGs down to the local level thereby giving an abstract formula a very concrete meaning. Many mapping users have described the baseline information that mapping provides as 'bringing light into darkness'. This information can then be used by local governments to develop realistic plans and to monitor progress.

In the case of the Afram Plains, mapping information has also enabled the local government to understand important cross-sectoral linkages and to develop a more strategic attitude to district-wide planning. For example, it has become clear that most of the underserved areas of the district cannot be reached without a significant improvement of the road network. Another option is to consider alternative technologies in poorly accessible and underserved areas.

And, mapping provided interesting insights for other sectors, in particular health and education. Opening up mapping to other sectors would certainly be a logical step. If mapping is especially targeted at sub-district levels as is the case in Nigeria and Ghana, it also has the potential to create downward accountabilities between the local governments and their constituencies. And, the increase in transparency of information also has a high potential to reduce corruption. It is these aspects of mapping that could have the most profound repercussions on existing policy processes since they have the highest potential to empower citizens.

Yet, the empowerment of citizens is also the most challenging aspect of mapping because it requires the highest level of engagement on the part of WaterAid and its partner organisations. The empowerment of citizens requires a neutral broker who can support citizens with information. As previously mentioned, this has

repercussions for the institutionalisation of mapping. It implies the long term engagement of an outside actor.

The overall challenges to mapping are twofold. On the one hand, weak government structures and procedures can render mapping a daunting task. Especially in those cases where planning is virtually absent from the local government and financial resources for water supply and sanitation are not actually channelled to the district, the question arises whether the political process is ready for mapping? Or, alternatively, how can mapping be adapted to the situation at the local level?

On the other hand, challenges are related to WaterAid's and its partners' capacities. If WaterAid's partners are to support local governments in mapping, they themselves need to have sufficient analytical capacity to support this process. How can they be assisted in developing these capacities? In order to make mapping sustainable, it needs to be financially supported in the short to medium-term by country programmes. How will resources be provided to guarantee regular updating of information? In West Africa, the intention is to scale up mapping as soon as possible at country and regional level. Is this possible without overburdening staff and without compromising on quality assurance and on the sustainability of the process?

4. Learning for advocacy and good practice

How can WaterAid best learn from the mapping experience in the five countries? Learning could take place at the level of an individual organisation, at country programme level and at the regional/international level. The three following tools and activities are suggested to facilitate these processes

'How to' guidelines

To encourage learning at the level of an individual organisation and at country programme level, lessons from this project could be summarised in a reference / guide for future engagement with mapping. They could be organised along various aspects:

A conceptual guide could be developed as a cross-reference to be used throughout the different stages of the mapping process from defining objectives and target groups to choosing methods, carrying out mapping and feed back to questions around sustainability. The guide could consist of a number of key questions accompanied by examples of good practice and lessons from different countries.

Self-assessment and internal learning

In addition, country programmes could conduct a self-assessment on the different aspects surrounding mapping in order to obtain a clear picture of where their main competencies and potentials for improvement lie with regard to mapping and to identify areas they would like to work on. This could involve questions of process, institutional capacity, collaboration with other actors, sustainability, technical GIS skills etc.

Another aspect that could be applied to future mapping activities is OPP's approach to internal learning. The process of continuous and self-critical engagement with its own work is a unique characteristic of OPP. Every week, the organisation holds a meeting reflecting and reviewing its activities. Quarterly reports and other exercises further help the staff to continuously question and re-orient their practices so as to correct the organisation's path. Maybe this approach could be adapted to the specific country situation by holding regular meetings with partners that 'look back'.

Exchange of experience

At the international/regional level, different types of exchanges could take place. There could, for example, be regional workshops where countries compare their mapping methodologies and map designs. There is a wealth of experience between different countries and a lot of potential to learn from each other. Also, it would be helpful to designate a person in each region, who is responsible for learning around mapping.

In addition, exchanges could be organised between different countries for specific learning purposes based on self-assessments of different countries. For example, a country programme like Malawi, which is highly specialised in the technical skills of mapping, could assist another country programme that is less strong in this aspect. At the same time, this country programme may be strong in another aspect like – say – participatory processes and could thus share this aspect of its work.

Annex 1: Comparison of main mapping features across case study countries.

	Ghana	Nigeria
Main features		
History of mapping	In Ghana, mapping was first carried out by the Afram Plains Development Organisation (APDO), one of WaterAid's local partners, at the request of the local government in the Afram Plains in 2004. The broad methodology developed by APDO is now replicated by other WaterAid country programmes and partners under the "Localising the MDGs Initiative" (LMDG-I; see also: Nigeria).	In Nigeria, mapping started on a larger scale in 2005/6. It is now the main tool for the Localising the MDG's Initiative, which forms the basis of all WaterAid's operations in the country. Under this initiative, WaterAid in Nigeria encourages local governments to prepare plans to achieve the Millennium Development Goals (MDGs). The LMDG-I stretches across all West African WaterAid country programmes, but is at different stages of development.
Objectives	APDO sees mapping not only as a tool to improve planning and monitoring of water supply and sanitation services at district level but also as a means to empower representatives from sub-district structures (area councils) and citizens. In addition, APDO uses mapping to make its own interventions more demand-responsive.	For WaterAid in Nigeria, the objectives of mapping are closely linked to the LMDG-I. The intention is to use mapping as a planning, monitoring and fundraising tool that will support local authorities across Nigeria to deliver water and sanitation services to their constituencies.
Target groups	APDO's strategy is to include as many stakeholders as possible in mapping from community to area council and to local government level. The most important target groups are the stakeholders at sub-district level.	The target groups are local government staff from different sectors, traditional leaders and communities but also the regional government agencies involved in water supply and sanitation service delivery.
Implementing partners	APDO established two committees in order to support the mapping process, an advisory committee at national level and a supervision and conceptual team at district level. Data collection and collation is done by community representatives under the supervision of area	In those areas where WaterAid has local partners, they act as intermediaries in the mapping process. Local government officials from different sectors are directly involved in data collection, input and analysis. At the regional level, partnerships are sought with the Ministry of Water Resources and/or sub-sector government

	councils, whereas more complex data analysis is carried out at district level. CERSGIS, a mapping centre at the University of Ghana, will now become an additional mapping partner.	agencies and with donor organisations.
Inputs		
Costs	APDO had a budget of GBP 10,000 in order to develop and test the mapping methodology. These funds covered the whole pilot phase from 2003/4 until 2005/6 including staff time and all inputs except for the print of maps. No major set-up costs were involved since APDO inherited technical equipment from UNICEF. WaterAid in Ghana estimates that the average total budget for carrying out mapping in one district will amount to GBP 5,000 in the future.	The average budget for mapping in Nigeria is GBP 7,000 per local government. This amount varies slightly depending on the population and geographic size of the local government and on the local contribution to the process. The set-up costs (purchase of a plotter, GIS software and 15 GPS receivers) are not included in this figure.
Methodology and technical inputs	APDO uses a combination of participatory and conventional research methods for data collection. GIS-based analysis has only played a secondary role, so far, and has been limited to improved water points.	WaterAid in Nigeria uses a combination of socio-economic data collection and GIS analysis for mapping. The country programme has created water and sanitation maps and also encouraged the drawing of community maps. For water, improved as well as unimproved sources were recorded.
Time and human resources	Mapping is envisaged to take three to five months from data collection to feedback at local government level. The exercise is very human-resource intensive. In the Afram Plains, as many as 240 data collectors from communities were involved.	On average, the mapping process in one local government is carried out in a time-span of three to four months. In addition to WaterAid and partner staff, 20-40 local government employees are directly involved in the process.
The mapping process		
Surveying	The process of mapping starts with an information campaign across the local government. In a second step, data collectors are	In Nigeria, the process is essentially the same as in Ghana with the difference that awareness raising mainly targets traditional leaders. Also, government officials

	chosen among communities and trained in participatory methods for socio-economic data collection. The surveys are done in teams of two under the supervision of area councils.	from different sectors rather than community representatives act as data collectors under the supervision of WaterAid and/or its local partner.
Mapping and analysis of results	Area councils with support from local government staff carry out a first, rough, compilation of data. The more complex analysis and report writing is done by the district mapping team consisting of APDO and the district planning and coordination unit.	Data input and analysis of the socio-economic data, and report writing are ideally carried by local government staff. In practice, WaterAid has provided substantial back-stop support so far. The analysis and production of maps is done entirely by WaterAid.
Feedback	Feedback sessions are conducted at area council and district level. As a first step, the data is verified by all stakeholders. This provides the basis for the projection of future needs and the prioritisation of actions at the different administrative levels.	A draft report is sent to different stakeholders including the traditional leaders, the local government chairman and other relevant agencies. A feedback session is convened, which serves to validate the report and to identify and prioritise action at local government level in order close the MDG gap in water and sanitation.
Updating	The data of newly constructed facilities are updated yearly based on reports from the different area councils. It is envisaged that a comprehensive review of the situation will take place every three years.	There was not yet a clear strategy about updating of information in August 2006.
Institutionalising mapping	The sector ministry has been closely involved in mapping from the start through its participation in the advisory committee at the national level. Discussions are currently underway with a wider set of stakeholders.	WaterAid in Nigeria intends to encourage collaboration with the Federal Ministry of Water Resources. Yet, the institutionalisation of mapping will also depend on the role that regional-level sector agencies play in mapping within the respective states.
Source: Interviews in Ghana and Nigeria		

Features of Mapping	Malawi	Tanzania
History of mapping	Malawi was the first WaterAid country programme to experiment with water point mapping. The first district in Malawi was mapped in November 2002. Since then the mapping of 24 out of 27 districts - the equivalent of roughly 90% of Malawi - has been finalised.	In Tanzania, water point mapping is still in a pilot phase running from mid-2004 until end-2005. By then, the 10 districts in which WaterAid is active will have been mapped. This covers approximately 10% of the Tanzanian mainland.
Objectives	The main objective is to provide a basis for a more equitable, efficient, accountable and transparent allocation of resources for water point construction and rehabilitation at district and sub-district level. Implementing partners had additional – sometimes – differing objectives.	The broad objective in Tanzania is the same as for Malawi. In addition, the aim of WPM is to assist WaterAid make more efficient and effective investments. Overall, water point mapping is also expected to strengthen the availability, depth and quality of data throughout the sector.
Target groups	The target groups for Water Point Mapping are District Coordination Teams and District Executive Committees (technical arm of the District Local Government). The MoIWD is targeted as an institutional home in order to establish WPM as a regular activity.	The immediate target group of WPM is the technical arm of the district level government. Ultimately, the expectation is that local politicians, civil society organisations and citizens will use the information to demand better services. The MoWLD and PO-RALG are targeted as potential institutional homes for WPM.
Implementing partners	Various donor agencies provide funding and/or take responsibility for data collection/ feedback; technical support i.e. data collection, analysis and training was carried out by WaterAid and starting from 2004 by WSSCC Malawi chapter and District staff collect WPM data.	WaterAid provides funding for the pilot phase in Tanzania. It cooperates with a local private sector company specialised in GIS which carries out data collection and simple data analysis. At district level, the technical arm of government is involved in data collection.
Inputs		
Costs	The costs are calculated per recorded water point; average mapping costs per district are estimated to range between US$ 10.000 – 20.000 depending on geographical size, population density and total	The contract between the private sector company and WaterAid in Tanzania foresees a lump sum payment of 7500 US$ per district for data collection and carrying out of simple analyses. This is regardless of the size of the

		district, the total number and accessibility of existing water points.
Time	On average, data collection required a month and data analysis and feedback an additional two months.	Data collection takes approximately 15 days, data processing and analysis an additional month. Feedback sessions are conducted as appropriate.
Human resources	Four district staff with bicycles or on motorbikes collected data in pairs, with a person from WSSCC/WaterAid or a donor ensuring quality control; extensive human resources were also involved in efforts to institutionalise mapping within the government.	One member of the private sector company together with a district officer is involved in data collection. At WaterAid, three staff are actively involved in mapping but only one person dedicates up to 30% of his time to the WPM process i.e. to quality control.
The mapping process		
Surveying	This is done in cooperation with the technical arm of the District Assembly; data collection includes taking the GPS location of each water point and filling in a questionnaire on technical and management information obtained from village or water committee representatives. A slightly different methodology was used by one donor (GITEC).	The process is roughly the same. The questionnaire was slightly amended in order to fit the situation in Tanzania. In addition to the GPS location and questionnaire, a digital picture of the water point is taken.
Mapping and analysis of results	Mapping includes the inputting of survey results into a database to form an inventory that can be displayed via a digital map. Based on the inventory, different analyses are possible (see Stoupy and Sugden 2003a, 200b for more information).	The software used to create an inventory based on survey results and to produce a digital map is the same as in Malawi. The maps used in Malawi appear to be slightly more sophisticated than in Tanzania (where mapping is still in a pilot phase).
Feedback sessions	Feedback sessions by WaterAid/WSSCC involved a first session presenting draft maps for amendments by district personnel and other local stakeholders and a second session presenting the corrected maps and discussing related decision-making processes.	The feedback sessions are organised by WaterAid in cooperation with the private sector company. They involve a presentation of the maps, digital photos and results from the data analysis and a short introductory training session on how to query the database that is

	Subsequently, 1-5 day training sessions were conducted for district personnel on how to use the database. In those districts where mapping was carried out by other implementing partners, the nature of feedback sessions differed and sometimes, no feedback was carried out at all.	installed on district computers. The main target of the feedback is the technical arm of the District Local Authority but the political arm is also invited.
Updating	Updating of mapping information is not carried out in a systematic manner. In Salima district, the District Coordination Team updates new water points on an annual basis and with technical assistance from WSSCC produces new maps. Various possibilities were discussed including obliging construction companies to register new water points as part of their contract.	There was no updating system in place at the time of the visit. In addition to obliging construction companies to report new water points (see Malawi), a website-based system was discussed that could be accessed by any authorised person with access to the internet or via mobile phone messages to report changes in the functionality status of a water point.
Institutional-ising mapping	As of now, mapping is not yet institutionalised within the Government of Malawi. Two options are currently in discussion: alignment with, and administration of, the mapping database with the UNICEF supported MASEDA database at the National Statistics Office; or hosting the database at the Water Resources Authority, an independent, yet to become operational body under the MoIWD.	WaterAid had held exploratory discussions with representatives from MoWLD and from the Local Government Reform Programme concerning the institutionalisation of mapping within the government. First reactions by the two institutions were positive.
Source: Interviews in Malawi and Tanzania		

	Nepal		
Main features			
History of mapping	In Nepal, mapping for advocacy purposes started as a reaction to the urban sector reform process in Kathmandu Valley. It was kicked off by a disagreement between the NGOs on the one hand and government and donor representatives on the other hand regarding the significance of poor urban dwellers relying on public stand posts as their main source of water supply. Subsequent to this mapping activity, other mapping initiatives evolved. Of those, this report also deals with stone spout enumeration and poverty mapping. The three activities are summarised separately below.		
	Mapping under urban water supply reform process	**Stone spout enumeration**	**Poverty mapping**
Objectives	The objective of mapping for the urban sector reform process is to influence policies in the direction of pro-poor service delivery of water supply and sanitation.	Stone spout enumeration aims to raise awareness about alternative water sources to the government's urban water supply network and to mobilise support for the conservation of these traditional water sources.	Poverty mapping was designed to support user committees and local governments in improving planning and implementation of service delivery, and for internal project identification and implementation procedures.
Target groups	High level government bureaucrats and donor agencies funding the sector reform process.	Users of stone spouts and government officials.	Water user committees and municipalities.
Implementing partners	The NGO Forum for Water Supply and Sanitation in cooperation with other local partner organisations of WaterAid.	The NGO Forum for Water Supply and Sanitation in cooperation with local volunteers and user committees.	WaterAid's local partners CIUD and ENPHO in cooperation with local user groups and the support of UN-Habitat.
Inputs			
Costs	Quantifying the costs involved in this process is difficult because the individual organisation	The costs are minimal as the activity mainly draws on volunteers.	No information

Methodology and technical inputs	contributed their staff time on a voluntary basis.		
	The methodology combined the mapping of public stand posts with the identification and enumeration of poor households living in slums and squatters and a sampled household survey regarding consumption patterns and preferences. ArcView, Access and Excel programmes were used for the data analysis.	The methodology is a combination of simple water quality and quantity testing techniques and a sample of qualitative key informant interviews. Technical inputs are water quality test kit, digital map, 2 litre bucket	The methodology is similar to PRA-type social mapping exercises regularly used to reach poor segments of the population during project implementation. It has two broad components: a digital map displaying services and housing infrastructure and a socio-economic household survey (based on ArcView, Access and Excel).
Time and human resources	5 months by 3-4 people and 30-40 additional enumerators for HH surveys	1-2 persons per survey	Approximately 3 months carried out by 4 civil engineers, 2 assistants, ~30 enumerators
	Mapping under urban reform process	**Stone spout enumeration**	**Poverty mapping**
The mapping process			
Surveying	The process started with the establishment of a task force representing the major government, financial and civil society institutions. After that, all public stand posts, slums and squatter settlements were identified and sampled, detailed surveys carried out for additional information on service levels and management arrangements.	Youths and students are trained in water quality and quantity testing. They then visit all stone spouts in one administrative area, carry out water quality testing, counsel local water users and identify existing management arrangements.	A user committee is formed and indicators for data collection are refined in cooperation with the committee. A map displaying the major features of the settlement including water and sanitation facilities is prepared, focus group discussions and household surveys are carried out to identify the socio-economic status of each individual household.
Mapping and	Mapping, socio-economic	The location of the stone spouts	The information is analysed and

analysis of results	surveys and analysis of results were carried out together.	is marked on a map and results are summarised in a report.	translated into a number of different maps.
Feedback	Feedback sessions were arranged at local level to counter-check the accuracy of the data; the multi-stakeholder task force was given opportunities for feed back on a regular basis and a national workshop was conducted at the end to disseminate the results to the wider public.		Feed back meetings are carried out with the community to validate findings.
Updating and institutionalising mapping	No updating was foreseen as this mapping process was a one-off activity to confront preconceived perceptions about the number and water consumption patterns of poor urban dwellers.	Updating of the stone spout survey is done on an ad hoc basis	The intention is that the user committee (in cooperation with the municipality) uses the data set and maps for taking decisions on project interventions and for the management of the scheme after project completion.
Source: Interviews in Nepal			

	Pakistan
Features of mapping	
History of mapping	Mapping under the Orangi Pilot Project in Karachi began in 1981 to help people design local sewerage systems. It has since been extended to mapping all major drainage channels and the entire sewerage system of Karachi. In total, around 650 maps have been produced by OPP's Research and Training Institute (RTI) and its partners. They include 206 maps within Orangi Town, a town of more than one million inhabitants of informal settlements within Karachi; 332 maps in Karachi but outside Orangi, covering roughly 60% of all informal settlements and all major drains flowing through the city of Karachi; and 106 maps in towns and villages outside Karachi.
Objectives	Through mapping OPP intends to document the reality on the ground, and to reduce the cost of laying pipelines by developing low-cost designs. OPP also aims to influence the government so that it supplements, rather than ignores, people's initiatives, and to reduce the corruption and waste of resources in infrastructure projects
Target groups	The immediate target groups of OPP's mapping are the people living in Orangi and in other low-cost housing areas. In addition, OPP targets Union Council mayors, engineers at the City District Government of Karachi and representatives of the International Financial Institutions.
Implementing partners	OPP has established its own mapping department in order to carry out mapping in Karachi.
Inputs	
Costs	Based on the calculation of time and material, OPP estimated in 2006 that the production of a typical map displaying different types of infrastructure at Union Council level with a population of approximately 75,000 people cost around PKR 10,000 (~GBP 100). This includes staff time and material needed for the production of the related maps and statistics.
Technical inputs and methodology	For producing a basic settlement map only a drawing board, scales, paper and pencil are needed. For more sophisticated maps of drains or larger proposals, plain tables and level machines are used to accurately measure angles and levels of the drainage system. Since 2004, OPP increasingly digitises hand-sketched maps with Autocad, a database software that can be obtained free of charge. OPP has also started to use satellite images as a means of documenting neighbourhoods.
Time and human	The whole process of producing a map, which indicates the basic services of a settlement of around 500 houses, takes six to eight weeks. With the use of satellite images, the duration of this process can be reduced.

resources	OPP's mapping department employs 15 persons. Some of the mapping staff supported through a Youth Training Programme (YTP) of one to two years and the remaining persons are employed on a permanent basis.
The mapping process	
Surveying and drafting	The mapping process always starts with the survey of a given settlement. On average, a settlement comprises of 60-70 lanes with around 500 houses. The survey is done by a pair of students, taking measurements and sketching a proxy-map by hand. During this process, interested community members are informed about the rationale and process of mapping. Then, back at the office, the proxy-map is drafted and put into scale.
Documentation of existing services	In the second stage, the students return to the settlement - this time documenting all existing water supply and sanitation services, their technical specifications, costs, state of functionality and who constructed them, based on information by local community leaders or CBOs. Back at the office, the existing sewerage lines are included into the map.
Proposal development	For the maps which OPP-RTI uses in order to work with government agencies, a proposal is developed based on the existing map. This proposal consists of a number of suggestions for improvement of sanitation infrastructure, sourced on the status of the documented infrastructure. This is accompanied by a cost estimate for the suggested improvements, based on current market prices of labour and material.
Updating and institutionalis ingmapping	Regular updating of existing maps is not crucial to OPP-RTI's mapping approach as the objective of mapping is to support implementation of services and to document what is on the ground. At the time of the visit in 2006, OPP-RTI and its partner, the Urban Resource Centre, planned to digitise all maps the organisations had produced over the last 25 years, and to document all remaining areas of Karachi which have so far not yet been covered. This information would then be outsourced to an independent "Mapping Unit" in order to make mapping information more easily accessible to the public.
Source: Interviews in Pakistan	

WaterAid

WaterAid's mission is to overcome poverty by enabling the world's poorest people to gain access to safe water, sanitation and hygiene education.

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