Every one's a winner? Economic valuation of water projects

DISCUSSION PAPER

Paper written by:
David Redhouse,
Paul Roberts and
Rehema Tukai

Improved maintenance and changed gender roles have a value – but what is it?

WaterAid/Caroline Penn

Key points

Time savings and reduced sickness are major benefits of water projects – the World Health Organisation (WHO) estimates 5.6 billion working days and 443 million schooldays would be gained annually if there was universal access to safe water and sanitation.

More time and better health reduce poverty. Women and girls particularly benefit through increased take-up of income-generating opportunities and education.

WaterAid is developing methodologies for valuing these and other benefits which can be equally important, such as improvements to self-esteem, confidence and security.

Valuations can be made at national economy level but household-based calculations give a more immediate impression of the poverty reduction benefits for the poorest.

Attribution of the wider benefits of water projects is not straightforward. Negative impacts may also occur such as losses of water-vending work or of opportunities to socialise while water hauling.

Preliminary calculations show that between $2 and $52 are returned for every $1 invested. The range reflects both variations in the nature of projects and their impacts and also the constraints of using pre-existing data.

Results remain positive under sensitivity analysis – especially of wage rates applying to time-saved. The next steps in the research will be at regional level and include data specially collected for valuation work.

Hours can be spent collecting water each day – how much is improved access to water really worth?

Introduction

Despite the poorest people consistently demanding improvements in their water supplies donor investments in water and sanitation have been declining. National government spending has often not been effectively directed at sustaining and expanding water services, particularly to the poorest people. Water is a basic need, now recognised as a human right. While the value of human life is clearly not seen simply in a financial cost figure, there are nonetheless clear economic justifications for increased access to water and sanitation. These can be assessed at national or global levels. However there is also a need – particularly with the Millennium Development Goals aiming to eradicate poverty – to look at the economic impact on individuals.

This perspective is also in line with WaterAid's mission to advocate for access to water and sanitation for the world's poorest people. WaterAid has developed valuation methodologies which principally focus on how a project's economics affect its beneficiaries (although this of course cannot necessarily be equated to changes in the cash in people's pockets).

Therefore, although some of the health or education valuations can be scaled up to national economy level, WaterAid's methodologies do not capture full macro-economic impacts such as increased productivity and tax takes or reduced health ministry budgets and tax rates. The methodologies are intended primarily for field use in valuing the impacts of individual water and sanitation projects.

This paper describes the range of those impacts – both beneficial and unbeneficial, sets out the methodologies proposed for valuing them, discusses issues such as double-counting and discounting which need to be addressed when aggregating the values over the lifetime of the project, and finally reports on some preliminary use of the methodologies by two of WaterAid's Country Programmes, in India and Tanzania.

Water and sanitation projects: impacts

WaterAid investigated[1] the impacts of some five-year old water and sanitation projects in its 2001 report *Looking Back*. Participatory assessments were made of projects across Ethiopia, Ghana, India and Tanzania. The identified impacts were grouped into seven themes: livelihoods and incomes; socio-cultural life; health and hygiene; psychological impact; education; gender issues; and community management and sustainability. The principal conclusions on five initial hypotheses about the impacts of water and sanitation projects were that: livelihood improvements and education attendance were the clearest impacts; women and children received more benefits; there were positive and significant environmental impacts; technical quality and effective management were equally important in operating water schemes; and ongoing support for communities increased their ability to sustain both supply systems and also hygiene behaviour changes.

WaterAid/Caroline Penn

Valuation methodologies and WaterAid impact themes covered	Health and hygiene	Livelihoods and incomes	Gender	Education	Community management	Psychological impacts
V1 – Water purchase savings	✓	✓✓✓			✓	✓
V2 – Time saved from fetching water	✓	✓✓✓	✓✓	✓		✓
V3 – Calorie-energy savings	✓	✓✓				
V4 – Improved health	✓✓✓	✓✓		✓✓		✓✓
V5 – Increased agricultural production		✓✓✓			✓✓	
V6 – Avoided days lost from school		✓		✓✓✓	✓✓	
V7 – Avoided days lost from school – girls	✓		✓✓✓	✓✓		✓
V8 – Improved operation and maintenance efficiency and associated gender roles		✓	✓✓		✓✓✓	
V9 – Increased community capital		✓			✓✓✓	
V10 – Psychological benefits		✓	✓			✓✓✓

Number of ✓s represents a generalised predominance; ie ✓✓✓ means this benefit is primarily an most directly covered under this theme. A single ✓ means that this benefit may be considered to cover this theme depending on circumstances. This is general guidance only.

Findings from other organisations

The understanding that access – or lack of it – to water and sanitation has economic implications is not new. In 1875 Joseph Chamberlain, then Mayor of Birmingham, estimated that lost wages and medical costs of the mortality and sickness due to preventable diseases in the city was £54,000 per year, two or three times more than the cost of building sanitary accommodation.[2] More recently in 1987 the World Bank concluded[3] that time-savings alone are a more than sufficient economic justification of the costs of water supply projects and indeed would usually support the highest service levels of private connections. However this benefit is only realisable from the perspective of the State. When only the cash costs of construction and the subsequent cash income from fees are considered, the World Bank has found[4] a return rate of 13% which, though acceptable on its own terms, is nonetheless the lowest of all infrastructure sectors and appreciably below the average 23% by which project income exceeds expenditure. Looking at wider economic effects the WHO estimated[5] in 2004 the costs and benefits of water and sanitation improvements at the global level and concluded that benefits worth $3 to $34 are returned for each $1 invested.

In its series of strategy papers for achieving the Millennium Development Goals (MDGs), the UK Department for International Development (DFID) documented the links between water and sanitation[6] with health[7] and education[8] in particular. Similarly in assessing the financing needs for achieving the MDGs, the UN Millennium Project is including[9] the need for sanitation provision of one toilet per 40 pupils within education and assuming that achievement of the health MDG to reduce infant mortality by two-thirds will be underpinned by delivery of the water and sanitation MDG targets.

Valuation methodologies

Despite widespread acknowledgment of the vital contributions of water and sanitation to nearly every aspect of poverty reduction, the political priority and consequent funding accorded to the sector have been declining. An assessment[10] for the April 2004 UN Commission on Sustainable Development found that only two – Tanzania and Uganda – out of 30 developing country Governments had clearly prioritised water and sanitation. In addition less than 40% of donors' funds for water and sanitation were targeted on those 30 countries even though they were home to nearly 90% of the world's 1.1 billion people without safe water. DFID's new Water Action Plan documents[11] a steady decline from 2.6% to 1.9% in the share of its budget which is clearly attributable to water and sanitation.

WaterAid is therefore concerned to underscore the value of water and sanitation to decision-makers on budget allocation and asked the consultancy firm Environmental Resource Management (ERM) to identify appropriate methodologies for valuing the impact of water and sanitation projects. The ERM

Box 1: Valuation methodologies for different impacts of water and sanitation projects

Impact		Principle	Formula	Tricky issues
V1	Water purchase savings	Where water was already being paid for, the price may reduce after the project.	$V_1 = (P_1 - P_2) \times Q_1$ P_1 = Price before project P_2 = Price after project Q_1 = Quantity of water used before project	Straightforward though unlikely to apply in many rural projects. Possible negative benefit of loss of water vendor employment.
V2	Time savings	There is a value in the time saved each day in fetching water because people may now use that time for work or other activities.	$V_2 = [(T_1/Q_1) - (T_2/Q_2)] \times W \times Q_1$ T_1 = Time spent water hauling before project Q_1 = Quantity of water used before project T_2 = Time spent water hauling after project Q_2 = Quantity of water used after project W = Wage rate (daily or hourly as appropriate)	Project will hopefully also have increased the volume of water being consumed and this may mask reduction in time spent per unit volume. Formula recognises this (but saving is only for original quantity of water). Wage rates may vary and will not be applicable in whole, for example if children were doing much of the water hauling.
V3	Calorie energy savings	People save energy – and therefore associated food costs – by not having to work so hard to collect water.	$V_3 = Z \times S \times (T_2 - T_1) \times P$ Z = Calories used per hour when hauling water S = Slope correction factor (for hilly areas) T_1 = Time spent water-hauling before project T_2 = Time spent water-hauling after project P = Food cost per calorie	Savings may actually be used to do additional agricultural work. If this is also being valued then double-counting needs to be avoided.
V4	Improved health	Diarrhoeal diseases in particular reduce as a result of better water, sanitation and hygiene thus saving household medical expenses as well as prolonging productive lives.	$V_4 = I \times CI$ I = Number of illnesses avoided CI = Household treatment cost per illness *or* $V_4 = DALY \times W_a$ DALY = Disability Adjusted Life Years W_a = Annual wage rate	Disability Adjusted Life Years reflect both early deaths and impaired ability to work. They are calculated from project specific illness incident data and also from national life expectancy and international disease disability weights produced by the World Health Organisation. The full formula is available in the ERM report.
V5	Increased agricultural production	Water supply can have a further value if it enables people to produce more crops or animals which they can then sell to increase their incomes.	$V_5 = (Q_2 - Q_1) \times P$ Q_1 = Quantity produced before project Q_2 = Quantity produced after project P = Price per unit of product sold	Need to be sure that the extra production does not reflect other factors – buying new land, using pesticides etc. Prices may be subject to seasonal variations.
V6	Avoided days lost from school	Children are more able to attend school if they do not have to spend time hauling water or are not sick so often.	$V_6 = LSDA \times TF$ LSDA = Lost school days avoided TF = Tuition fees per day paid by households	With the spread of free Universal Primary Education it may sometimes be better to use national Education Costs (EC) per pupil per day in place of TF. LSDA itself can be calculated simply as the product of I (see V4) and the proportion of school-age children in the community. Double counting with children's time-savings (V2) is a particular risk.

V7	Avoided days lost from school – girls	Girls' school attendance is particularly valuable since they pass on benefits from their education to their own children, thus prolonging those children's productive lives.	**$V7 = (DALYI \times W_a) - C$** DALYI = Infant Disability Adjusted Life Years W_a = Annual wage rate C = Cost of bringing a girl to literacy	Infant Disability Adjusted Life Years are themselves calculated from a formula (set out in the ERM report) for the impact of increased female literacy on the life expectancy of those women's children. May be difficult to attribute benefits clearly. Formula derived from a study quoted in the 2002 World Development Report showing a 10% fall in infant mortality for a 10% increase in female literacy. This was based on experience of 13 countries between 1975 and 1985 but only in Africa.
V8	Improved operation and maintenance and changed gender roles	Better operation and maintenance can be valued by considering the labour it has required.	**$V8 = (DTC - DT) \times VBL$** DTC = Annual down time in control community (DTC_m where men have operation and maintenance responsibility) DT = Annual down time in project community (DT_w where women have operation and maintenance responsibility) VBL = Annual value of benefits as calculated by other formulae *or* **$V8 = T \times W_a$** T = Time spent annually on operation and maintenance W_a = Annual wage rate	The benefit can be calculated on a gender basis where appropriate by using DTCm for a control where men have operation and maintenance responsibility and DTw for a project where women have the operation and maintenance responsibility. This can equally be done with Tw and Waw.
V9	Increased community capital	After a successful water project the community may be more able to act together for other projects as seen in the value of those projects or in the value of water system contributions.	**$V9 = [(C2 + S2) - (C1 + S1)] / T$** C1 = Value of community assets before project S1 = Total of community savings before project C2 = Value of community assets after project S2 = Total of community savings after project T = Time in years between 'before' and 'after'	Water contributions may be easy to identify (from accounts etc) but assessing other community assets may be more time-consuming. Could be a negative effect if money is misused. Alternatively community might prefer to borrow and use their regular contributions to repay this sum rather than save up contributions, which are at risk of being misused before being spent.
V10	Psychological benefits	Beneficiaries, especially women, may value increased security (from not walking to remote places for water or going out after dark to defecate) or greater status or self-esteem (from having safe water and sanitation facilities).	**No formula** – value to be derived from surveys asking people what value they put on these benefits or asking them to rank in order of importance alongside items of known value.	Surveys can be very complex to construct and expensive to carry out. But this needs to be balanced against the importance of these impacts under a rights-based approach to development.

report[12] takes *Looking Back* as its starting point and, having grouped socio-cultural and psychological impacts together as was done in some of the original *Looking Back* studies, proposes at least one valuation method for each of the six remaining themes (as shown in the table on page 3 reproduced from the report). For some of the formulae different versions – identified by an 'e' suffix as in V9e – are provided where the benefits are calculated at the level of the national economy or community rather than for individual households.

Further details of each method are in Box 1. The report also provides worked examples for each method. These examples are based on a single scenario of a community of 20 households served with a handpump which reduced water hauling trip times from 60 minutes to 20 but, at the same time, cut vendors' water sales by two-thirds. All the example values – negative as well as positive – are then added together for a period of ten years (which is the expected lifetime of the project in this scenario) with the values for years 2-10 reduced by a per annum discount rate of 5%. The method also avoids double-counting benefits for children who performed 40% of water-hauling work and so saved time and also increased their school attendance.

Preliminary use of the methodologies

As the methodologies were being developed the formulae were applied to existing data sets from WaterAid's programmes in Tanzania (Box 2) and India (Box 3). This capitalised respectively on an extensive data collection already undertaken for a poverty study and on well-established NGO partners which maintain fairly comprehensive records on basic issues of quantities of water collected and of times taken to do so.

While in a large part this was done simply to iron out any arithmetical errors in the methodologies or any ambiguities in either their descriptions or the instructions for their use, the results are presented here to emphasise, at the very least, the difficulty of valuing benefits unless special data collection exercises have been undertaken.

Initial findings

The calculations which could be done for individual projects in India and Tanzania found that returns for every $1 invested ranged from $2 to $52. The biggest returns achieved in India underscored the effectiveness of a project which had been designed to save beneficiaries' time. In Tanzania up to 10% of benefits came from increased agricultural income. This raised an issue of equity since the extra income went to only a few of the households, which each gained more than implied by the overall 10% increase.

The returns in Tanzania from community management and community capital were relatively small. These issues are worth further exploration and possible revision to the methodologies (if for example it can be shown that community management actually prolongs system functionality, then the value of such management might be expressed as a share of capital replacement cost rather than simply the value of time spent on maintenance and other management activities). But these returns might already be interpreted as showing either a relatively low cost of regular maintenance (the low value of community management) and/or an inappropriately low level of charges for the water services (the low value of accumulated community capital).

In India returns were higher in the urban project in part because of the higher number of beneficiaries per handpump reflecting the greater urban population density.

Some basic sensitivity analysis was performed by adjusting the input data to the formulae to find out how much this affected the final results. Economic returns were sensitive to the value placed on beneficiaries' time. In India this value was reduced to just over a third of the male labourer's wage rate because most of the water hauling is done by women and children, neither of whom would earn the same wage rate as men for the same type of work. (In part this reflects inequalities in wages but it also reflects women and children spending more of their time on those domestic tasks which are systematically undervalued by mainstream economics calculations.) However, when even this reduced rate was halved there was still a return of $2 for every $1 spent. In Tanzania the wage rate was reduced to the basic unskilled minimum of 500 shillings (25 pence) per hour. Even in the project not designed to save time there were still returns of $1.25 for every $1 invested while in the other projects returns of up to $14 continued to be found. Given in addition that the calculations did not include the value of other impacts such as health improvements, these returns are comfortably in excess of the 10% return rate required for example by the World Bank to approve projects and so highlights the risk that investments which could bring significant wider economic benefits might nonetheless be turned down on the basis of a narrower assessment of project cash flows. This significance of time-savings' value also underscores the 1987 World Bank conclusion[13] that any level of service below individual household connections actually represents a very expensive water supply for its beneficiaries (basically because people are much less efficient carriers of water than pipes) and so "whenever per capita incomes of rural populations are much over $250, it will seldom pay to invest in systems that involve headloading of water."

Box 2: Tanzania

Project		Mwankoko A	
Project lifetime (10 year) values		$	$
Cost			9847
Impacts	Time-savings (V2)	13,473	
	Calorie energy savings (V3)	4506	
	Community mgt (V8.2e)	154	
	Community capital (V9e)	85	
	Total	18,218	
Return: $2 back for every $1 spent			

Project		Mwankoko B	
Project lifetime (10 year) values		$	$
Cost			9040
Impacts	Time-savings (V2)	25,595	
	Calorie energy savings (V3)	931	
	Agriculture (V6)	3477	
	Community mgt (V8.2e)	207	
	Community capital (V9e)	40	
	Total	30,250	
Return: $3 back for every $1 spent			

Project		Kisaida	
Project lifetime (10 year) values		$	$
Cost			4009
Impacts	Time-savings (V2)	50,596	
	Calorie energy savings (V3)	30,193	
	Community mgt (V8e)	154	
	Community capital (V9e)	27	
	Total	80,970	
Return: $20 back for every $1 spent			

Project		Kisaki	
Project lifetime (10 year) values		$	$
Cost			4009
Impacts	Time-savings (V2)	36,743	
	Calorie energy savings (V3)	18,718	
	Community mgt (V8.2e)	154	
	Community capital (V9e)	73	
	Total	55,688	
Return: $14 back for every $1 spent			

Assumptions

In the absence of real baseline data for the four project villages the daily water consumption and time expended in water hauling at a neighbouring village, Uhamaka, with similar weather and socio-cultural contexts but without an improved source, were used as proxy values for Q1 and T1.

Project lifetime is assumed here to be equal to the estimated design period of the pump. For boreholes fitted with diesel pumps such as Mwankoko B, the design period is equal to 20 years. For boreholes, tubewells and shallow wells fitted with Afridev handpumps such as those in Mwankoko A, Kisaki and Kisaida, the design period is 10 years.

Every hour saved is assumed to be worth as much as the wage rates. Daily wage rates range from 500 - 1500 Tanzanian shillings (Tsh) depending on whether it is for manual or skilled labour. From experience most villagers will invest time savings in manual labour, therefore 500 is arguably the better value to use. However the valuations were done initially using 1000 Tsh because this was the value used by the programme in its original estimates of the value of community contributions. But subsequent analysis was done using both the Tsh 500 and Tsh 1500 values. (£1 = 2000 Tsh)

Sensitivity of the results

When wage rates of 500 or 1500 Tsh are used the returns would be either reduced or increased by 37%, 42%, 31% and 33% respectively for Mwankoko A, Mwankoko B, Kisasida and Kisaki.

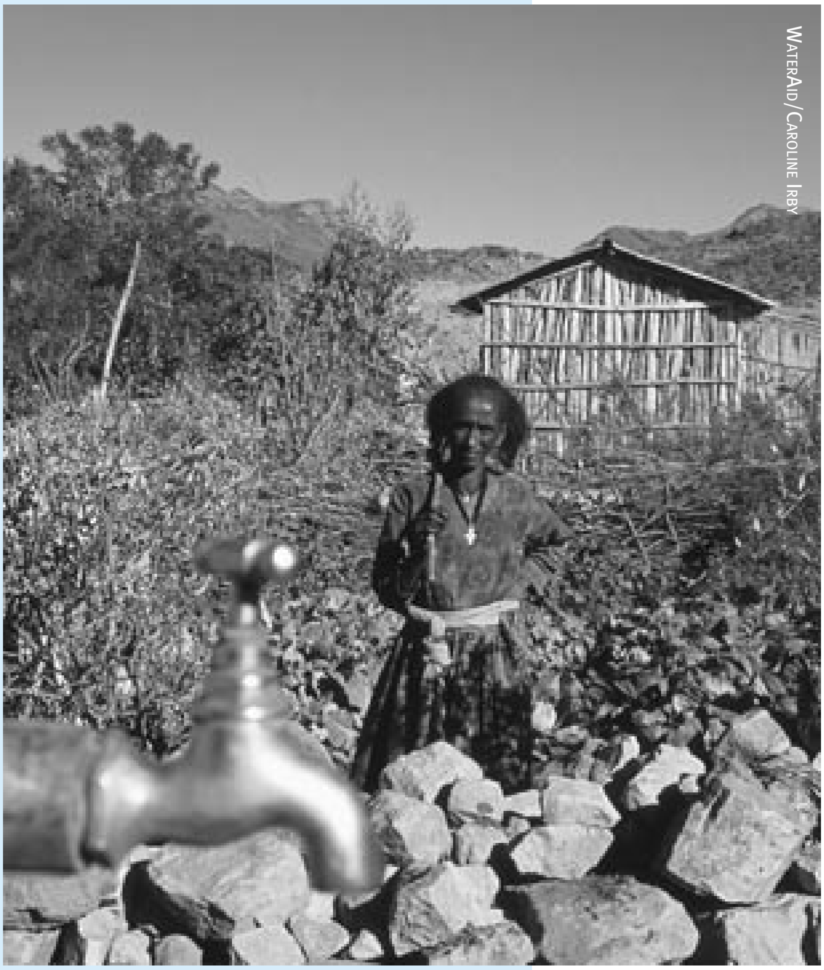
Issues

One reason for the differences in the return values is the technology choice made for both source development (ie borehole or shallow wells) and pump technology (ie handpump or diesel pump). Generally, high returns were realized with handpump technology and shallow wells because both investment and maintenance costs were considerably lower. Despite using handpump technology the source development (borehole) in Mwankoko A involved very large investment costs. Moreover this developed source was not designed to bring significant gains in water hauling time because it is close to the traditional source. Given also that it serves only a few people the return from Mwankoko A is relatively small.

Questions for further consideration include:

1. The prospects for collecting better health data. For example the existing data on diarrhoea relates to district or ward levels and therefore could not be used in these village level comparisons
2. Whether more discounting of the calorie energy-savings is required in order to avoid double-counting this benefit with the increased productive agricultural activities
3. Whether the reported water volumes related to the actual volumes used or only to the containers
4. How to be clear about who gets the benefits. Some such as time savings (V2) are shared across all households but others are not so equitably distributed. For example only a few households benefit directly from the agricultural opportunities of using water for gardening. These are households who can access land (through ownership or renting) within a certain radius (approx. 250m) of a water source. Other members of the community may nonetheless benefit indirectly through buying this produce at a lower price for their own consumption.
5. How significant are any changes in income compared to original incomes and therefore whether some households at least will pay more for higher levels of service such as on-plot connections.

Clean water next to home – what are the consequential increases in self esteem worth?



WaterAid/Caroline Irby

Box 3: India

Project 5117		Reeds NGO (rural villages)	
Project lifetime (15 year) values		$	$
Cost			28,438
Impacts	Time-savings (V2)	88,250	
	Calorie-energy savings (V3)	9902	
	Total	98,152	
Return: $3 back for every $1 spent			

Project 2232		Gramalaya NGO (urban slums)	
Project lifetime (15 year) values		$	$
Cost			23,260
Impacts	Time-savings (V2)	138,339	
	Calorie-energy savings (V3)	47,082	
	Total	185,421	
Return: $8 back for every $1 spent			

Project 5079		CWD (rural villages)	
Project lifetime (15 year) values		$	$
Cost			39,839
Impacts	Time-savings (V2)	1,427,622	
	Calorie-energy savings (V3)	629,916	
	Total	2,057,538	
Return: $52 back for every $1 spent			

Assumptions

In calculating the returns for V2, it was assumed that each hour saved was worth as much as the local hourly wage rate. The calorie consumption rate was calculated by building up a typical diet of a (poor) person in the project area. This was done using information provided by local partner NGOs. The calorie content of that diet was then calculated to arrive at the average daily calorie consumption (2297 calories/day). Partner NGOs also provided information on the cost of the foods in the daily diet. This allowed the calculation of the cost of a (poor) person's daily calorie consumption at $0.21. Partners were also consulted on whether men, women and children eat different amounts. Their view was that each member of the household eats roughly the same amount of food.

Sensitivity of the results for CWD project 5079

- If time savings were halved, returns would be reduced by 45% to $28 for every $1 spent.
- If calorie cost savings were halved, returns would be reduced by 15% to $44 for every $1 spent.
- If wages were halved, returns would be reduced by 35% to $34 for every $1 spent.
- If wages were halved AND calorie cost savings were halved, returns would be reduced by 50% to $26 back for every $1 spent.

Issues

The wide variation in the returns can be explained by the fact that the CWD intervention was primarily a time-saving intervention, whereas the other two projects were not. While the Reeds and Gramalaya projects did lead to time being saved on water collection, this was not the principal reason for undertaking the projects. It is therefore important not to assume, based merely on the results for V2 and V3 savings, that the CWD project was better value for money than the Reeds or Gramalaya projects. The Gramalaya project for instance, was focused mainly on sanitation so there may be added value in health savings rather than time-savings.

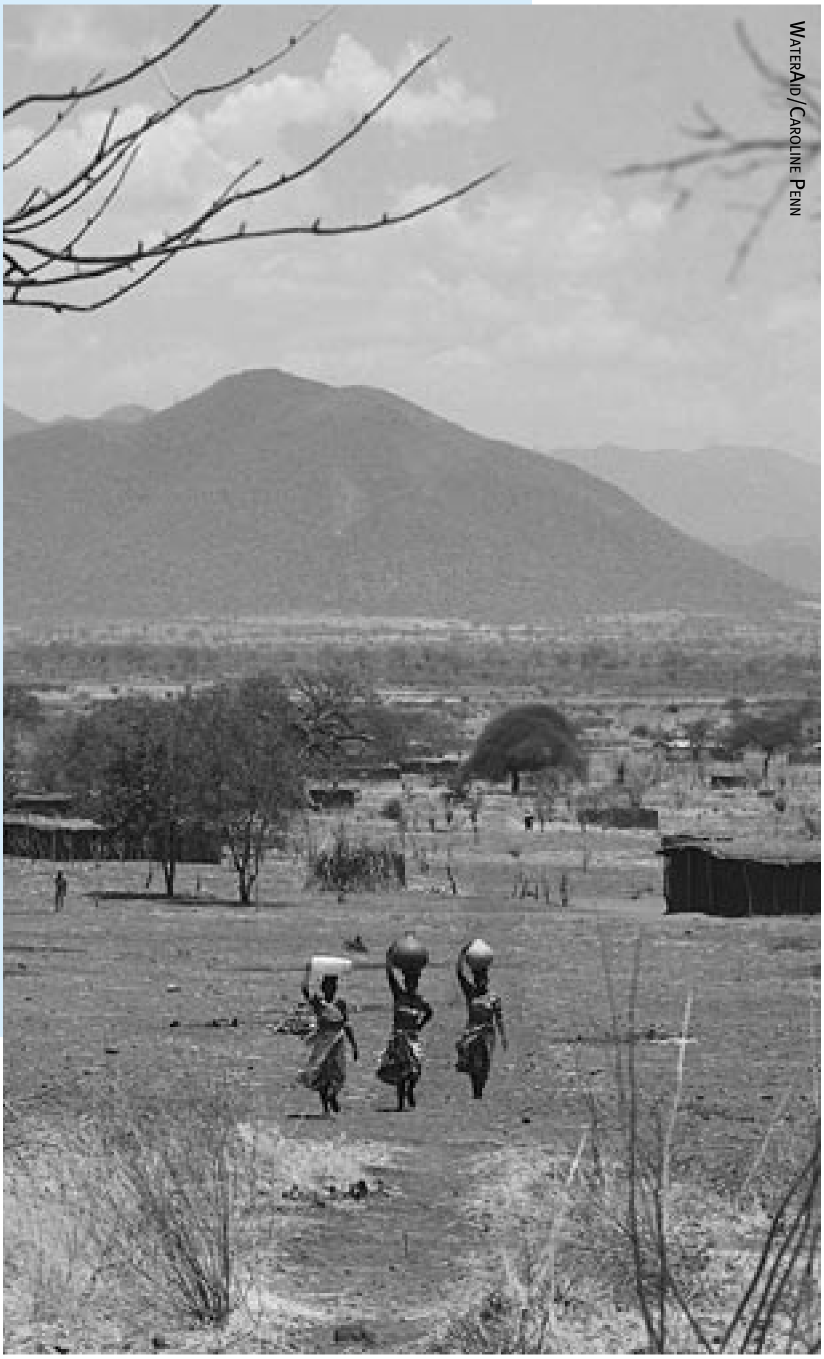
Questions for further consideration include:

The need to make complete assessments of all benefits – especially in health improvements – in order to directly compare returns from these three projects or any others.

The desirability of interviews on the ground with key informants about whether people (i) are actually earning a figure close to the wage rate with their water collection time savings, or (ii) themselves value their time saved to that extent.

Interviews could also be used to check whether there are any differences in quantity of food consumed by men, women and children which should be taken into account in calculating calorie cost-savings.

Easier access to water means that women and children no longer have to risk potentially dangerous long walks for water – what price do they place on that?



WaterAid/Caroline Penn

General issues

As ever the robustness of results is critically dependent on the reliability of the initial data. This has been particularly problematic so far because the data was not collected for the purpose of valuation. In addition, and contrary to the advice of the ERM Manual, the selection of benefits for valuation on this occasion was not in accordance with their likely significance but simply with the availability of data. This means that potential negative benefits – such as conflicts between those who gain and those who do not or only to a lesser extent – have also not been fully investigated. Robustness and relevance will however increase with the next phase of the work when primary research is undertaken at country programme level. It will also then be critical to identify the distribution of benefits thus giving proper coverage to equity issues.

Even in the next phase there will remain scope for variation in the treatment of aggregation and double-counting. The Tanzanian and Indian projects were aggregated over different timescales respectively reflecting the design life of the equipment itself or the design capacity of the project (ie the ability of the same-sized system to meet growing demand). Double-counting issues were not really raised in India because data was only available for time-saving and the consequential calorie-savings. In Tanzania where some data was available for agricultural production there could arguably be a double-counting issue in valuing both the benefits of saved calories and the new income from extra production, which will obviously have also involved extra work (and thus calorie-consumption). However the extra production was concentrated in very few households which suggested that the calorie-savings remained available to the majority.

Attribution of impacts also remains an area for scrutiny. So far a strong line has been taken that if there is doubt then the impact should be left out. In Tanzania for example only dry season additional agricultural produce was included. Additional rainy season output was excluded since it could have been facilitated by water sources other than the project. Health impacts – diarrhoeal disease and bacterial conjunctivitis reductions – were similarly excluded because data was not geographically or chronologically precise enough for confidence that they were due to the water projects. In further work it will also be necessary to identify any other projects which may have contributed for example to health improvements or wider changes in the macro-economic context which could explain increased household production and incomes.

The methodology proposed to value some of the impacts most important to beneficiaries – greater self-esteem or security for women – requires specialist surveys. Such valuations therefore cannot be done using the kind of 'off-the-shelf' data which have been the basis of these preliminary uses of the methodologies in Tanzania and India.

Next steps

The findings and issues identified above need to be further investigated. A peer review of the consultants' report will now be sought. The methodologies will then be refined and trialled in specific regional contexts. WaterAid will therefore look to four of its Country Programmes, one from each region in which it works, Southern, East and West Africa and South Asia, to take up this issue as a subject for primary research. It is envisaged that there will be in-country seminars on the methodologies and also special data collection exercises for valuation purposes.

These results will then feed back into WaterAid's international promotion of water sector investments but will equally be useful for advocacy at country level.

Footnotes

1 Adnuga A et al *Looking Back: Participatory Impact Assessment of Older Projects* (WaterAid 2001)

2 Hunt T *Building Jerusalem* (p259) (Weidenfeld & Nicholson 2004)

3 Churchill A.A. et al *Rural Water Supply and Sanitation – Time for a Change* p34 World Bank Discussion Paper No.18 (World Bank 1987)

4 Goldin I. et al *The Case for Aid* (World Bank 2002)

5 Hutton G. & Haller L. *The Costs and Benefits of Water and Sanitation Improvements at the Global Level* (WHO 2004)

6 *Addressing the Water Crisis* (DFID March 2001)

7 *Better health for poor people* (DFID November 2000)

8 *The challenge of universal primary education* (DFID January 2001)

9 *Millennium Development Goals Needs Assessments* (UN Millennium Project draft paper available at http://www.unmillenniumproject.org/documents/mp_ccspaper_jan1704.pdf.)

10 *A scorecard assessment of developing country and donor progress* (A consortium of NGOs delivering on water April 2004 available on websites of Care, Oxfam, WaterAid et al eg http://www.careinternational.org.uk/cares_work/what/urban/NGO_Water_Consortium_CSD_12_Case_Scorecard_Report.pdf) Further details are in Making every drop count (Tearfund 2004)

11 *Water Action Plan* (DFID March 2004)

12 *Manual for Valuing the Benefits of WaterAid's Water and Sanitation Projects* (ERM May 2004 available at www.wateraid.org)

13 1987 Churchill A A et al op cit.

WaterAid – water for life
An international NGO dedicated exclusively to the provision of safe domestic water, sanitation and hygiene education to the world's poorest people.

UK charity reg: 288701

WaterAid
Prince Consort House
27–29 Albert Embankment
London
SE1 7UB
Telephone +44 (0)20 7793 4500
Website www.wateraid.org
Email wateraid@wateraid.org