RWSN Strategy Paper
Sustainable Handpumps

Background

The humble handpump provides the majority of rural water supply "access" in Africa. However, depending on the country and oftentimes regions within each country, handpump failure rates can be anywhere from 15-50%, averaging around 30% continent-wide[1].

Several reasons for this unacceptably high failure rate have been identified, including: inappropriate technology; poor construction; lack of community involvement and subsequent sense of ownership; poor community organization or cohesion; lack of follow-up support and/or training; and the unavailability or high cost of spare parts.

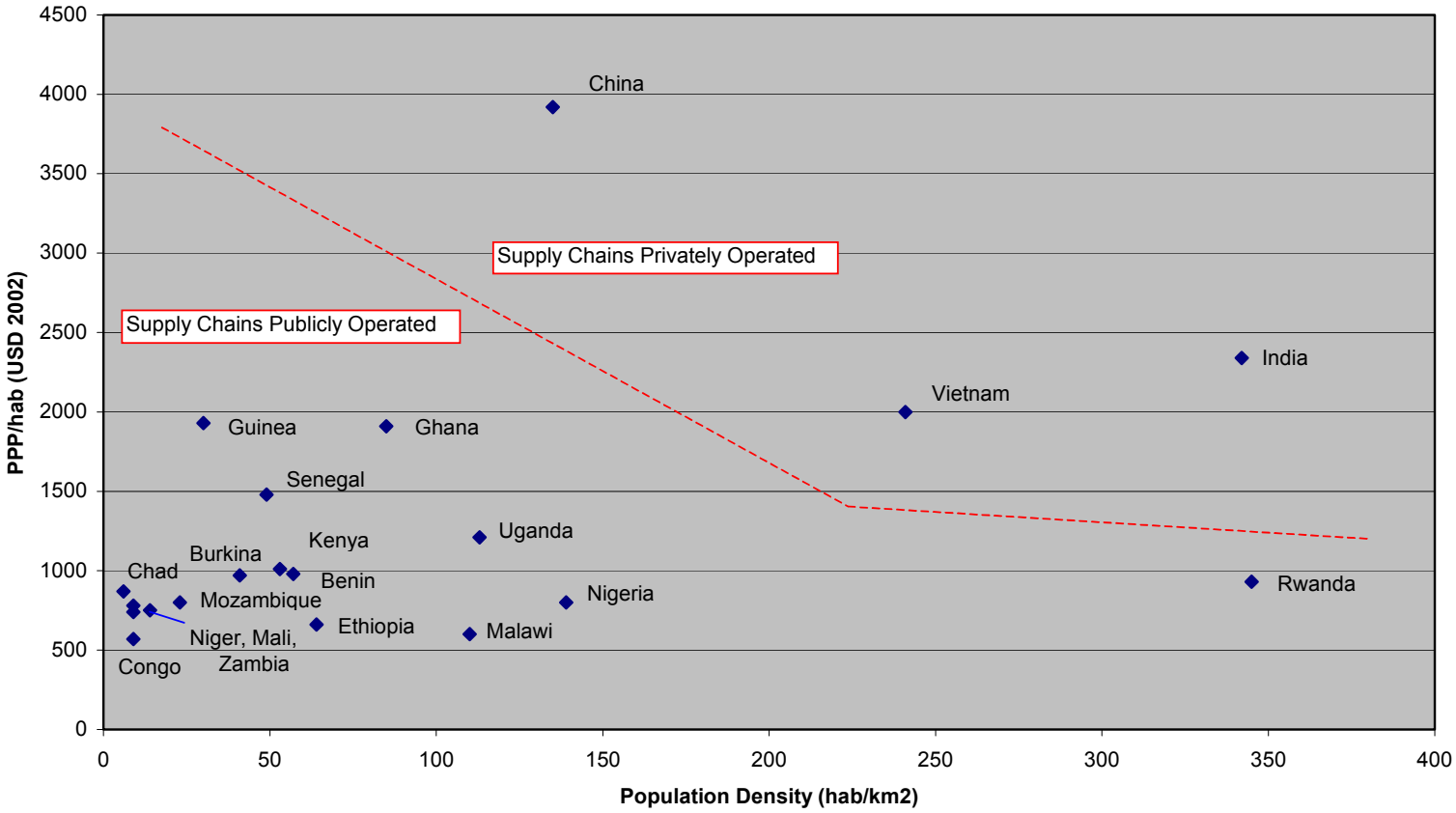
Getting handpumps to work reliably in rural areas of Africa has proven to be a particularly intractable problem. A long-term study by WEDC on sustainable handpumps in Africa has had to recognize that, "The project has experienced great difficulty in identifying sustainable handpump projects in Africa."[2] Similarly, a recently developed World Bank scorecard for eleven low-income Sub-Saharan Africa (SSA) countries[3] found that while six of the eleven countries surveyed are rated as having "fully user-friendly handpumps", none had fully sustainable spare parts supplies (nine of these had partially-sustainable spare parts supplies, while two countries were rated as having completely unsustainable supply chains.) If we accept the sustainability of spare part supply as a proxy measure for overall handpump sustainability, the implication is clear – few countries, if any, are successfully addressing the problem of unsustainable handpumps.

Research looking directly at handpump sustainability is sparse. We cannot even say with certainty what the primary causes are for non-functioning handpumps in any given country or sub-region within a country. Rural monitoring systems are weak or non-existent, and efforts to determine why handpumps are not functioning, maintained, or repaired are seldom attempted or reported.

Using private sector supply chains as a proxy measure for handpump sustainability, it appears that successful private sector participation has been found only in countries where rural population densities are high, incomes are rising, costs to the consumer are low, and commercial networks already flourish[4]. While these conditions can be found in several Asian countries, no SSA country as to date been identified as meeting most or all of the criteria for successful supply chain creation, with the possible exception of South Africa[5] (see Figure 1).

[1] Preliminary Desk Study of Potential for Self Supply in Sub-Saharan Africa, Sally Sutton, WaterAid and the Rural Water Supply Network, October 2004, Table 1, p. 7.
[2] Guidelines for Sustainable Handpump Projects in Africa, Interim Report, October 2002. Available at http://www.lboro.ac.uk/wedc/projects/shp
[3] Millennium Development Goals (MDGs) for Water and Sanitation, Country Assessments for Benin, Burkina Faso, Chad, Ethiopia, Ghana, Mali, Mozambique, Niger, Senegal, Tanzania, and Uganda., The World Bank, December 2003.
[4] Setting Up Viable Supply Chains for Hand Pumps in Vietnam, Derrick Ikin and Erich Baumann, SDC, HTN, SKAT, undated.
[5] South Africa is not shown in Figure 1 - it has a population density of 35 p/km² and PPP of $9,160. Bangladesh is at the opposite extreme – a population density of 1,007 p/km² and PPP of $1,590.

Figure 1: Handpump Supply Chains Operation Plotted Against National Income and Population Densities for Select Countries of Asia and Africa



It is interesting to note that key approaches for attaining handpump sustainability over the past two decades (three-tiered O&M, VLOM handpumps, the demand responsive approach, and standardization of handpump models, for example) have not fully solved the handpump sustainability problem in the African context[6]. Table 1 suggests the direction we want to be heading, and where we currently find ourselves.

Table 1 – Current Situation and Desired Mid-Term Results for Handpumps

Current Situation	**Mid-Term Desirable Situation**
70% of handpumps functional	90% of handpumps functional
Capital cost recovery 0-20%	Capital cost recovery >50%
Handpump working life 3-8 years[7]	Handpump working life 7-12 years
Water insecurity	Water security
Community management model	Management model choices
Install-repair-reinstall-repair-upgrade	Install-upgrade

New approaches to handpump sustainability can be characterized as follows: (1) improved technology, (2) new management models, or (3) increased cost recovery (water pays for water.) The following list is illustrative, though not comprehensive:

Table 2 – New Approaches to Achieve Handpump Sustainability

New Approach to Handpump Sustainability	**Descriptive Highlights**
Technological	
Generic spare parts only[8]	Rope and bucket, or similar local solutions, at least 12 countries[9].
Few non-generic spares	Rope pump, Flexipump, etc. (Ghana, Madagascar, Mozambique, Kenya, Senegal, Zimbabwe, among others)
More durable parts	Beer's Piston for Afridevs[10], Kenya
Non-community management	
Total Warranty Concept	Manufacturer guarantees handpump operation and maintenance for its entire working life, users pay for this service; Mauritania[11]
Leasing	Small town operators extend their O&M services to surrounding rural areas, users pay for this service, Angola[12]
Lowest Subsidy	Contractors provide/manage service, winning bid requires lowest subsidy
FRUGAL[13]	Services built and managed through competitively bid lots covering large areas; users recover O&M and most capital costs
Regular follow-up	Communities are provided with social and technical support either through public or private means; users recover full O&M costs
Water Pays for Water	
Productive use[14]	Water is provided in quantities sufficient for productive use and income generation, mostly at the household level; users recover high % of investment costs and pay for full O&M and replacement costs
Self-Supply	Users fully pay for continually upgrading locally appropriate solutions, oftentimes at the household level

[6] VLOM for Rural Water Supply: Lessons from Experience, WELL Study, Task No:162, Jeremy Colin, March 1999, available at: http://www.lboro.ac.uk/well/resources/well-studies/full-reports-pdf/task0162.pdf

[7] Estimate based upon known handpump sustainability rates and likelihood of early rehabilitation.

[8] Though not a handpump, the rope and bucket does represent a sustainable option that is widely recognized throughout Africa, and is capable of being upgraded to a handpump over time.

[9] Dataset for Select African Countries, Rural Water Supply and Sanitation, Joseph Narkevic, WSP/World Bank, unpublished.

[10] See: http://www.handpump.org/handpump.htm

[11] Sustainable Handpump Projects in Africa, S. Parry-Jones, R. Reed, and B.H. Skinner, WEDC, 2001.

[12] Leasing, A New Handpump O&M Concept, Paul van Beers, 27th WEDC Conference Papers, Lusaka, Zambia, 2001.

[13] Forming Rural Utility Groups and Leases. A long-term, private sector management concept under design by WSP-Africa for rural areas, including small towns and disperse rural settlements.

[14] The use of family handpumps for small plot agriculture is widespread. Experience with the treadle pump in Africa shows that income generation can positively influence spare part supply. Atelier International sur les Chaînes de Distribution des Pompes à Pédales, WSP/World Bank, SDC, BNWP, October 2002.

But will any or all of these new options result in higher rates of sustainability? Time series data on handpump sustainability are not easily obtained, so we are limited in determining which factors may have the greater impact on increasing sustainability rates. If we consider current knowledge we can look at each of the known factors of sustainability and consider what sets of policies and actions need to be studied and/or widely replicated.

Table 3 – Primary Factors of Handpump Sustainability

Category	Factor of Sustainability	Relative Importance
Technical	Construction quality	A
	Technology choice	B
Social	Demand-Responsive Approach (including asset management knowledge)	A
	Community organization / cohesion	A-C
	Perceived value of water from improved source	A
Institutional	Spare parts supply	A
	Management model choice	B
Financial	Income levels	A
	Credit availability	C
Environmental	Source water protection	B
	Increased groundwater use	A-C
Human Resources	User group capacity building	A-C
	Implementer capacity building	B
Legal	Ownership	C
Others	Political changes, administrative changes, the "champion" phenomena, donor/lender effects, etc.	A-C

A=most important C=least important A-C=Depends upon local conditions

Many suggest that community management has not been fairly tested to date. DRA is not especially well implemented in SSA countries[15], and even where it is, there are few countries providing communities with post-implementation support, whether social or technical. When support is provided it tends to take the form of direct rehabilitation of existing works, as opposed to regular follow-up. On-going research into this issue[16] will soon provide some substantive guidance.

The flagship recognizes that the community management model can still be strengthened considerably, and potentially result in greater handpump sustainability. We call this concept "Community Management PLUS" which involves permanent monitoring and follow-up of community managed service provision, either directly through local governments, user associations, or private-sector contractors. This model would be expected to have a positive impact on every major factor of sustainability with the possible exception of capital cost recovery, although it would also be feasible to develop Community Management PLUS as a fee-based system that includes capital cost recovery.

[15] In research presented on implementing DRA in Sub-Saharan Africa made by Jennifer Davis during the World Bank Water Week in March 2003, it was found than only four of eight "DRA" projects surveyed actually allowed community choice.

[16] A major study began in early 2004 on the role of follow-up in post-construction sustainability, financed by the World Bank-Netherlands Water Partnership, with initial findings expected during 2005.

Objectives and Goals of the Sustainable Handpumps Flagship

The final objective of this flagship is to increase the percentage of functioning handpumps[17] through the application of improved policies and practices. Functionality is defined along a continuum of parameters that includes at a minimum the following: handpump working lifespan[18]; frequency of rehabilitation; continuity of functioning; down time for repairs; water yield; water quality; and waiting times or number of users.

The intermediate goals of this flagship include the following:

- To establish unambiguous benchmarks for handpump sustainability
- To increase the useful lifespan of the handpump
- To decrease repair down times
- To increase capital cost recovery
- To increase the number of available options (both technical and managerial)
- To decrease the number / frequency of major rehabilitations
- To decrease the % of wells / boreholes that are dry for parts of the year
- To decrease the number of handpumps that function for less than one year (or some other appropriate critical time period that this work may help define.)

Proposed RWSN Strategy

Key questions:

- What are the primary reasons for non-functioning handpumps?
- What data and information are currently available, and/or regularly available?
- What are the current best practice benchmarks for sustainable handpumps?
- What is the best suite of policy options and implementation modalities that can improve handpump functioning in a given area?
- Where will the results from this work have the greatest impact on service provision?

Key assumptions:

- Groundwater will continue to be the primary water source of rural people in Africa
- Community services will continue to be demanded and offered
- Africa will present the greatest challenge to handpump sustainability
- Countries will continue to decentralize
- Water stress will continue to increase
- Rural incomes will rise slowly
- Handpump densities will continue to rise slowly
- Communities do not always prefer to directly manage RWS services
- Households are willing to invest significantly in well functioning RWS services
- Most of the factors of sustainability are long term.

[17] It will be necessary to explicitly define terms such as "functioning", "rehabilitation", "maintenance", "yield", etc.
[18] Handpump lifespans are likely to vary widely by model, place of manufacture, number of users, and other factors. Additionally, borehole working lifespans need to be studied. While it is assumed that the majority of waterpoint failures are due to failing handpumps and not failing boreholes, this remains to be conclusively shown.

Proposed Methodology

Considering the fact that Sub-Saharan Africa is composed of more than 40 countries, many of which are heavily utilizing handpumps for RWS, it is imperative that this work identify at an early stage the countries that are most concerned about tackling this problem, along with a number of interested professionals and institutions that could be instrumental in generating answers to the difficult questions of handpump sustainability.

It is proposed that a Sustainable Handpumps Working Group (SHWG) be formed that would include a small number of people dedicated to guiding this task over the next 18-24 months. The SHWG will be responsible for monitoring RWSN's progress on thematic activities, reviewing key documents (TORs, draft reports, etc), providing substantive ideas and recommendations for on-going and future work, and acting as an entry point to major pathways of dissemination, advocacy, and learning. Some potential SHWG members are suggested in Table 4. Membership would best be limited to 8-12 people. The RWSN flagship coordinator will be responsible for leading the SHWG. Most members should be willing to self-finance their participation, though some payment of expenses may be required.

Table 4 – Potential Sustainable Handpump Working Group Members

Potential Partner	Added Value
WEDC	In-depth knowledge achieved through major study on handpump sustainability in Africa; long history of involvement in sustainable rural service delivery
WaterAid	RWS project experience in 11 African countries[19]; leading advocacy agent for rural service delivery
World Bank/WSP	On-going investments in RWS in dozens of African countries; direct access to policy and decision makers
UNICEF, CARE	On-going RWS programs in dozens of African countries
IRC	Intimate contact with regional knowledge centers; history of interest in RWS issues, including O&M and community management
National Governments	Policy-setters and decision-makers; significant investment in RWS; mobilizers of large-scale programs
Skat	Knowledge reservoir on handpump technology
Other major NGOs, universities, knowledge centers, individual professionals, private sector firms, etc.	Variety of skills and networking ability.

With the core SHWG in place, a scoping study will be undertaken in order to better quantify the nature of the sustainable handpump problem, identify countries that could most benefit from this work and show interest in future studies, pilots, training activities, study tours, workshops, policy dialogue, and thematic leadership among African states.

Using the scoping study as an initial guide, three to five country or thematic studies[20] will more closely examine handpump sustainability in nations that are especially concerned with their low rates of functioning handpumps, have made great strides in improving the sustainability of handpumps, or are experimenting with promising alternative management models. These studies will attempt to uncover with greater specificity the causes of non-functioning (and functioning) handpumps, and identify the best options for making rapid

[19] Burkina Faso, Ethiopia, Ghana, Madagascar, Malawi, Mali, Mozambique, Nigeria, Tanzania, Uganda, and Zambia.

[20] Co-financing of country studies by national governments or development partners would allow for a greater number of studies.

improvements in the sustainability rates. A country dialogue will be undertaken, and long-term assistance offered to governments interested in exploring new policy directives and implementation practices.

It is proposed that a policy analysis modeling tool be developed, that would show the potential impact on coverage levels given various investment, policy, and sustainability scenarios. It would be put into an interactive format that government officials, private advocates, donors, and investors could utilize to develop financing and implementation strategies.

The modeling tool would be joined by other instruments developed as a part of this thematic flagship for performing initial country assessments, designing communications and dissemination strategies, developing a national/regional handpump sustainability strategy, utilizing implementation checklists, applying benchmarks, developing monitoring and evaluation methodologies, and determining investment decisions. These tools would be developed through a series of country studies, and disseminated through regional workshops.

RWSN will follow-up the scoping and country studies with direct country support to governments anxious to apply the tools and take strategic decisions in order to significantly improve handpump sustainability. The tools will be available for testing by May 2006 and roll-out by December 2006.

Table 5 - Tentative Work Plan for Sustainable Handpump Activities from February 2005 – June 2006

Activity	Start/End Dates	Responsible
Formation of flagship working group (SHWG)	Feb/Mar 2005	J. Narkevic
Develop communications strategy	April/June 2005	SHWG
Rapid assessment and scenario analysis work	April/July 2005	SHWG
Publish and disseminate rapid assessment results	July/Sept. 2005	RWSN/SHWG
Preliminary identification of interested country partners	June/August 2005	SHWG
Implementation of three to five handpump sustainability country studies	July/December 2005	SHWG
Synthesis document produced and disseminated	December 2005/ February 2006	RWSN/SHWG
Development of policy and implementation tools	Jan/May 2006	SHWG

Given the magnitude of the problem and number of contributing factors to handpump sustainability, the flagship will have to coordinate with other organizations independently undertaking complementary work, such as Skat, WEDC, IRC, the World Bank, major NGOs, key bilateral donors, and others. It is critical that the SHWG keep apprised of on-going activities outside RWSN, through its professional and institutional networks, and feed such activities back into the flagship so as to enrich the outputs and eventual impact of its work.

In this same way, RWSN and the SHWG must remain alert for opportunities to use partner organizations to finance country studies locally, offering technical support, peer review, and widespread dissemination.