Practical ideas to reach SDG6.1 and water related SDGs in rural Africa

Context

One of the challenges in rural Africa is to reach water related Sustainable Development Goals. Suggestions to improve rural water supply are described in the book on rural water supply (Carter. 2021) and discussed in RWSN D groups. The suggestions in this paper are based on this information and on decades of experiences. We are convinced that "water for all", in Sub Saharan Africa (SSA), is possible if we learn from failures and successes.

For instance, clean and safe drinking water is possible with good quality household water filters, as now is proven in Ethiopia. Awareness creation and subsidies needed to also reach the poor would cost a 1 time donor investment of $3/person, so to reach 2.1 billion people would "just" cost $6 billion. A part of the needed funds could be generated with carbon credits.

In areas with rainfall of more than 200mm/year, families can have an improved water source at less than a 30 minutes return trip, so a "basic service", with locally produced technologies and targeted subsidies of on average $25/person. Needed are innovative approaches and shifts;

- from the focus on safe water at the tap to include point-of-use water treatment
- from fully subsidized communal systems to partly subsidized self-supply and family systems
- from a focus on water for drinking and domestic use to also water for productive use
- from imported technologies to also locally produced technologies

Some suggestions:

1. Safe drinking water with household water filters

Most of the 2.1 billion people who do not yet have safe drinking water live in rural areas (WHO 2021). Reasons for contaminated water include unimproved water sources and recontamination in transport or storage at the household level. In these cases Household Water Treatment and Safe storage (HWTS) can be an interim measure especially for biological contamination. (Clasen 2016). There are over 20 HWTS options "approved" (WHO 2018). Of all products, water filters are the most effective since they are more user friendly and are more consistently used than other products. If filters are combined with improved hygiene, the reduction of water borne diseases can be 60% (Brown 2018). Candle type table-top water filters for 1 family cost $20 - $40. Membrane type filters that can provide water for 50 people cost $40 to $100. Maintenance of these options cost $0.5 to $2 person/year. Richer families can pay filters themselves, poor families need subsidy.

Suggestions

1. **Disseminate experiences on failures and success.**
   There are many examples where HWTS was not successful like a large filter project in Kenya, but increasingly there are successes (Heierli. 2010). An example is Ethiopia where 300.000 filters were produced locally. Utilities now sell them as an additional service (Foppen. 2019)
2. **Large scale investment in awareness**
   Awareness that clear water can be contaminated, that especially young children get sick from contaminated water, but also about the benefits of HWTS like the reduction of health-related cost. Examples of successful awareness campaigns are in Cambodia (IDE 2018)
3. **Build up supply chains of attractive, effective and affordable HWTS options**
   Make sure that people have choices, that in each town there is a range of HWTS options, especially filters, and that spare parts are available. This requires support to the local private sector, training of sales persons and finance options.
4. **Targeted subsidies, no distortion of markets**
   NGOs and others who now give away products like Chlorine tablets or water filters could give vouchers instead. This would support the commercial supply chain instead of distorting them. A white paper on markets was published. (CAWST. 2021)

2. Use the enormous potential of (supported) Self-supply

Worldwide over 1 billion people have self-supply water sources (Sutton 2021). In Africa there are 7 to 9 million hand dug wells owned by one or a few families. The good news is that innovations have reduced the cost of drilling of wells, pumps, storage and aquifer recharge. For instance Rotary jetting can drill wells to 80 metre deep in softer layers and over 200.000 wells were drilled in Nigeria and other African countries (Danert 2015). Manual drilling like EMAS can go to 60 m deep in softer layers and over 70.000 wells are commercially drilled in Bolivia at a cost of $10/ meter including a pump, so a well of 20 m deep cost around $200. Options like SHIPO drill go up to 45 m deep in hard layers.

With options like a $20 Tube recharge, yearly 100 cubic meters of rainwater can be recharged in the upper aquifer so prevent family wells from running dry. Locally produced Pitcher, EMAS and rope pumps cost $50 to $120. New small solar pumps with yields of 1 to 5m3/day for households and small scale irrigation become available at cost of $150-$500.
Innovative options are known in one country but unknown in others.

Suggestions

1. Support a South-South knowledge exchange on lower cost technologies fit for self-supply.
2. Upgrade existing hand dug wells to an improved water source, for instance with a well cover, a low-cost hand pump or solar pump. To guarantee safe water use a household water filter.
3. Create show case areas with functioning systems to create demand for wells, pumps, tanks.

3. Invest in family/farm wells for productive use

Almost all farm families in the USA and Europe had their own well with a hand pump.
With economic development they bought an electric or engine pump, so climbed "the water ladder".
The same can happen in developing countries. An example from Nicaragua:
Around 1995 the locally produced rope pump became a national standard hand pump and some 20.000 were installed in communities and by 2003 provided 27% of the rural water supply. Another 50.000 rope pumps were installed at families. Richer families/ farmers paid 100% (full self-supply). Poor families got a pump as donation from a NGO with the condition that they invested in the well (supported self-supply). 20 Years later many families who had a rope pump now have piped water or an electric pump. A survey of 4600 families indicated that a rope pump at premises increased family incomes by an average of $225/ year (Alberts. 2003). The impact of all family pumps in the last 20 years has been over $100 million so a huge economic impact. The aid to start this development (training local workshops in production, subsidies for poor families) was around $7million. This is a return of investment is a factor 15, so a good aid investment. Another example is Niger where thousands of irrigation wells were drilled by hand or with jetting at cost of $100-$400. (Danert. 2006)
A recent study indicated that women in SSA spend 40 billion hours per year to collect water.
With a well at or near the house, women would save time. Another advantage of family wells is the maintenance. Experience in Zambia and other countries indicate that over 90% of family owned pumps are functioning. Reasons are clear ownership, convenience but also increased food production and income. Experiences also indicate that families with a well share water with an average of 50 other people, so "family owned pumps serve small communities" (Jacana SMART Centre 2022).
In short, water at or near premises is key to rural development.
Richer families can pay themselves, poor families need support of $15 to $35/person.

Suggestions

- Build supply chains of affordable water technologies
- Train drillers, pump producers in technical skills; train entrepreneurs in business skills. .
- Create show case areas.
- Support poor families. For instance, if they dig/drill the well, they receive a pump

4. Produce technologies locally

The perception is that reaching SDG6.1 in SSA and in sparsely populated areas is expensive.
In general this is right. Providing water for a community of 50 people with a machine drilled borehole and an imported pump cost (CAPEX $2000 - $6000) would cost $40 - $120/person (Sutton. 2021).
However by using upper aquifers where they exist, small diameter casings and locally produced drill sets and pumps the cost of tube wells of 20 to 60 m deep including a pump can range from $200 to $1200, significantly reducing the per capita cost.

Suggestions

1. Where possible produce water technologies locally. Besides lower cost, advantages include less import so less foreign currency needed, spare parts and skills locally available and creation of employment in production and installation.
2. There is a range of (new) lower cost technologies that are fit for families and small communities, for instance technologies as promoted by SMART Centres. In in areas with rainfall of 200 mm/year or more these technologies can provide **basic water service** at an investment cost (CAPEX) of $15 to $35/person.

5. Invest in the 3 Ts (Training, T…. T…)

At the Stockholm water week in 2018 it was mentioned that to reach SDG6, 3 million practitioners would be needed. To train all these people would require a "Marshall plan" type of capacity building.

There is a lack of engineers who can design new water systems, control the quality of drilling companies, maintain pumps. A lack of well drillers who know the (new) manual drilling technologies and technicians who know how to produce pumps; in short a lack of local capacity.
At the Glasgow conference in 2021 (more) funds for climate adaptation were promised for developing countries. Funds could be used to build up local capacity in a range of water technologies but also approaches like the 3R, spate irrigation, green roads for water (MetaMeta.2022). Another example to adapt to climate change is Deep Bed Farming combined with soil conservation as practised by 20.000 farmers in Malawi and possibly scaling to 1 million farmers (Tiyeni. 2022). When rainwater is stored in the ground in the wet season it can be pumped up in the dry season. Building local capacity in a wide range of related skills would result in reaching SDG6.1 in rural areas but also have much impact on water related SDGs like reducing rural poverty, food security and employment.

Suggestions

1. One or more WASH Centres in each country where relevant technologies are demonstrated. A One-Stop-Shop where NGOs, companies, families can get advise on the most cost-effective options for the local context and capacity to train in technical and other aspects. Examples of such training centres are EMAS centre in Bolivia, SMART centres in 9 African countries and CAWST/WET centres in 4 countries
2. Large scale programs to build up local capacity in water related knowledge and skills
3. Use carbon credits to fund programs.

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Information SMART Centres and SMARTechs www.smartcentregroup.com